Manuals
Service Manual

QuietTrak™

Ambulatory Blood Pressure Monitoring System

Operator's Manual

Welch Allyn Tycos®

QuietTrak Serial Number: _____

Date of Purchase:_____

Dealer Name: _____

Telephone: _____

Dealer Representative Name:_____

Telephone: _____

Welch Allyn/Tycos

Sales Representative:_____

WARNING

This device not intended for use with a defibrillator, for neonatal use, or with any intravascular fluid system.

The CE mark on this product indicates it has been tested to and conforms with the provisions noted within the 93/42/EEC Medical Device Directive.

CE0050

European Regulatory Manager
Medical Division
Welch Allyn Ltd.
Navan, Co. Meath
Republic of Ireland

Welch Allyn/Tycos QuietTrak™ ABPM Operator's Manual

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Patent No. 5,556,073

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About the Manual

This Operator's Manual is designed to help you get the most out of your Tycos QuietTrak Ambulatory Blood Pressure Monitor. The manual has eight **tabbed** sections. The first page of each section outlines the contents so you can readily find what you need.

The first section, **Product & Report Features**, introduces you to the product and its capabilities. The next four sections (**Getting Started, Choosing Program Options, Patient Hookup** and **When the Patient Returns**) take you step-by-step through the functional operation of the ABP monitor in a logical sequence.

The last three sections, **Clinical Recommendations, Troubleshooting Guide**, and **Service, Supplies & Maintenance**, are informative resources which offer troubleshooting or special help as needed.

Recommendations for First-Time Users.

First-time users may want to begin learning about the Tycos QuietTrak ABPM by reading **Product & Report Features.** Or, for hands-on instruction to begin using the ABP monitor, turn to **Getting Started.** Next, familiarize yourself with **Patient Hookup** and **When the Patient Returns.**

Recommendations for More Experienced Users.

For day-to-day operation, experienced operators can refer to the convenient **Quick Guide to Hookup & Operation** found on page iii.

For those interested in learning and customizing the ABP monitor's optional features, **Choosing Program Options** guides you step-by-step in selecting the options you want.

This manual is also available in German, French, Spanish, and Italian. Contact your local Welch Allyn/Tycos Service Center for more information.

Style Features of the Manual

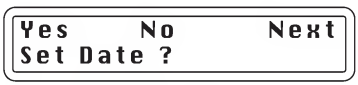
The manual is written in a logical sequence so that you can follow the events page-by-page and step-by-step. Each step is identified with a bold subheading in the left margin...

(example of style features)

Setting the Date (example of a subheading)

...and detailed instructions follow. With this format, you can rapidly skim over the parts you are familiar with and advance to the steps you need.

The instructions are enhanced with illustrations and graphics. Each instructional step is paired with a graphic representation of the corresponding ABP monitor display:



(example of a graphic)

When the **Set Date ?** message appears, you are ready. Press **Yes** in response to the **Set Date ?** message. A new message will appear.

Additional comments are placed in shaded boxes to draw attention to them. They are also identified by the following symbols appearing in the margin:

! Important note or caution

* Helpful hints, notes or suggestions

? Conditional statements

(example of a box frame)

! The boxed messages are important.
Be sure to read them.

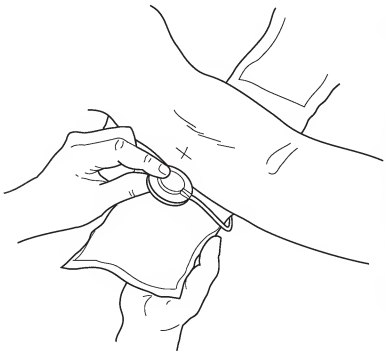
At the conclusion of each section, there are suggestions to guide you where to go next. So, regardless of where you choose to begin, the manual conveniently directs you to related topics.

Suggestion for First-Time Users:

- Learn more about the ABP monitor in **Product & Report Features**, Section 1, and
- Practice using the monitor in **Getting Started**, Section 2.

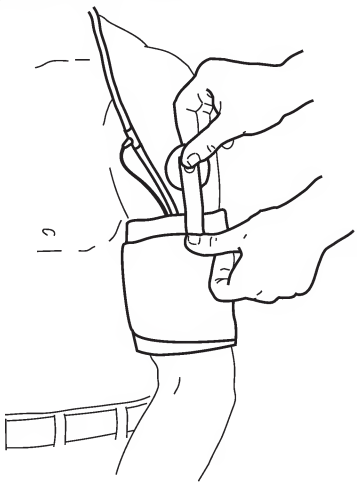
Quick Guide to Hookup & Operation

The Quick Guide briefly outlines the steps needed to operate the Tycos QuietTrak ABPM and hook up the patient. The complete instructions are found in Sections 2, 3, and 4.

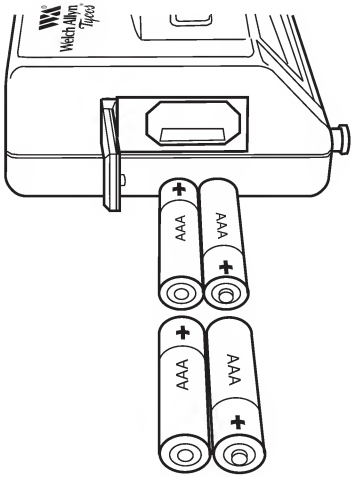


1. Select appropriate cuff size.

Carefully attach microphone over brachial artery 1 to 1.5 inches (2.5 to 3.8 cm) above elbow (use microphone anchoring pad). **Be sure the labeled side of the microphone faces away from the arm.**



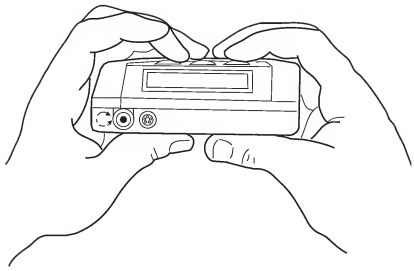
2. Wrap cuff on patient's arm and secure it with cuff anchoring pad.



3. Load four new AAA batteries.

Wait while ambulatory blood pressure monitor completes Self-Test.

4. Get ready to set patient ID :



If **Set Patient ID ?** is not shown, respond to displays as follows:

Review Data ? No.

Print Data ? No.

Erase Data ? Yes.

Are You Sure ? Yes.

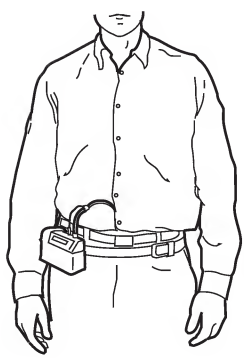
5. Set the patient's ID.

Answer **Yes.**

(Use **Up** or **Down** to rotate to the number, then **Next** to proceed to each space, and finally to proceed to next display.)

Set parameters, including :

- Number of periods,
- Beginning time of each period, and measurement interval
- Maximum pressure,
- Display On or Off,
- Patient Activation Button On or Off



6. Connect ABP monitor to patient's cuff assembly.

Take three or more office runs.

Begin Regular Runs.

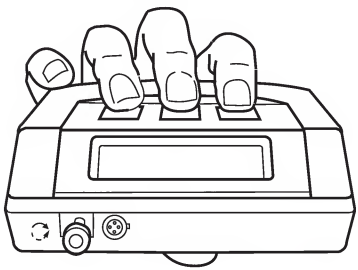
Insert ABP monitor into pouch and position pouch on patient with belt or shoulder strap.

7. Instruct patient...

concerning Patient Diary, Patient Activation Button, how to cancel readings, and to remain still during readings.

8. When patient returns

1. Remove cuff assembly and ABP monitor from patient.
2. Review diary entries with patient.



3. End ABP monitoring session by pressing all three buttons simultaneously.

4. Press **Yes** to begin reviewing data on the ABP monitor's display.

5. Press **Next** to move to **Print Data ?** screen.
6. Connect ABP monitor to printer and print data.

Product & Report Features 1

The features and specifications of the Tycos QuietTrak Ambulatory Blood Pressure Monitor explained in this section will help you understand its capabilities. You may not use every feature offered, but knowing what's available will help you optimize your monitoring procedures.

At the end of this section, the pages of the report are illustrated and explained so that you can get the most out of the ambulatory blood pressure data.

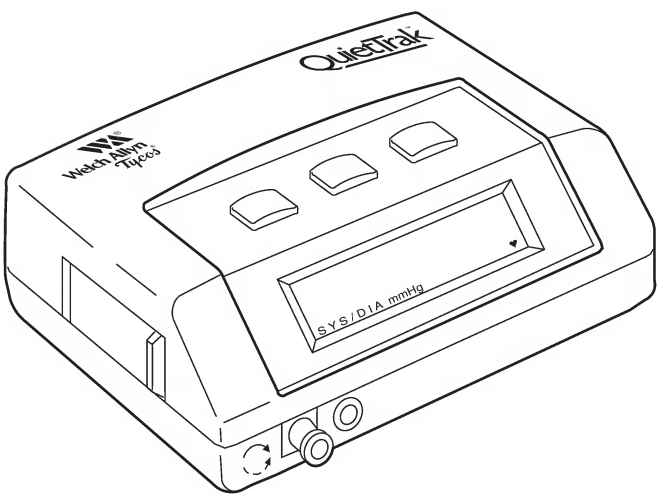
Page	Topic
1-2	Product Features
1-4	Specifications
1-6	The Report

Product Features

Accurate Measurement

What makes the Tycos QuietTrak Ambulatory Blood Pressure Monitor accurate? Developed and tested by a leader in the blood pressure industry, the Tycos QuietTrak ABPM sets unbeatable standards.

- Auscultatory method — the gold standard in the physician's office.
- Tested scientifically by Tycos and validated by leading institutions, to meet accuracy standards set by The Association for the Advancement of Medical Instrumentation (AAMI) and The British Hypertension Society.
- Blood pressure measurements determined by this device are equivalent to those obtained by a trained observer using the auscultation method. Measurements are within the limits prescribed by ANSI for electronic sphygmomanometers.
- Verifiable accuracy. With the Calibration Check feature, you can compare the ABP monitor's measurement with your office manometer and be assured that the results are reliable.
- Linear deflation is adjustable at 2, 3, 4, 5, or 6 mmHg per heartbeat.



Patient-Friendly Design

Tycos developed a small, quiet ABP monitor with the patient's comfort in mind, and there are no electrodes to wear.

- Lightweight — only 12.5 ounces (355 gms) with batteries.
- Small package — 4.5 x 3.4 x 1.6 inches (11.43 x 8.6 x 4.1 cm).
- Quiet cuff inflation and silent deflation make the Tycos QuietTrak ABPM ideal in the ambulatory environment because it is hardly noticed. That's so the ABP monitor can do its job while the patient does his.
- Patient Activation Button is easily accessible by the patient; an opening on the pouch guides the patient's finger to the button by touch, without having to look.
- Real time clock on the ABP monitor's display assists the patient with diary notations.

Programmability

- Programming is quick and uncomplicated, with simple three-button control and the LCD.
- Programmable periods — The automatic measurement intervals are selectable from 5 to 120 minutes, with up to four different time periods.
- The Start Button allows patient activation of readings, but can be disabled.
- Measurement Parameters can be modified from one ABP monitoring procedure to the next, and customized to the patient's needs or the type of study being done.
- The parameters you select are stored in memory so that you won't have to reselect ABP monitoring parameters from one procedure to the next.

Data Retrieval

- All measurement data can be quickly reviewed on the QuietTrak liquid crystal display
- Direct connection to Epson compatible printer for standard hard copy report.
- Optional PC program allows customized data and report generation via a variety of printers.

Specifications

Power Requirements:

Four alkaline AAA (1.5V) batteries (nickel cadmium optional)

One lithium 3V internal battery

Dimensions:

11.43 x 8.6 x 4.1 cm (4.5 x 3.4 x 1.6 in.)

Weight:

355 gms with batteries (12.5 oz.)

Leakage Current:

Meets AAMI, UL, and IEC specifications with regard to leakage current.

Environmental Operating Requirements:

Temperature: 0° to 43.3°C (32° to 110°F)

Humidity: 15% to 95% non-condensing

Altitude: 150 m (500 ft.) below sea level to 1500 m (5000 ft.) above sea level

Environmental Storage Requirements:

Temperature: -20° to 50°C (-4° to 122°F)

Humidity: 15% to 95% non-condensing

Altitude: 150 m (500 ft.) below sea level to 1500 m (5000 ft.) above sea level

Measurement Ranges:

Systolic pressures 60-250 mmHg;

Diastolic pressures 30-160 mmHg;

Cuff pressures 0-300 mmHg;

Heart rates 40-160 bpm.

Up to 300 measurements may be taken on one set of AAA alkaline batteries (based on a medium size cuff).

Measurement Cycles:

Able to store up to 300 measurements.

Each measurement includes date/time/Systolic pressure/Diastolic pressure/heart rate/initiation reason code/error code.

Cuff Inflation Time:

Typically 15 seconds; will vary with cuff size and target pressure.

Overpressure Detection:

Hardware: 300 mmHg

Over 10 mmHg Detection:
Hardware: No longer than 180 seconds

Safety Feature for Deflation:
Can deflate from 250 mmHg to 20 mmHg in less than 4 seconds.

Deflation Rates:
Adjustable at 2, 3, 4, 5 or 6 mmHg per heartbeat

Accuracy:
Meets 1987 AAMI standards (at 3 mmHg/second deflation rate)

Pressure Accuracy:
± 3 mmHg or 2% of reading, whichever is greater.

Clock Accuracy:
± 2 seconds per day, or 1 min./month

Reliability:
50,000 typical cycles

Pressure Measurement Method:
Auscultatory (Diastolic based on fifth Korotkoff sound)

Automatic Measurement Intervals:
Selectable from 5 to 120 minutes, with up to four different time periods.

Autozeroing:
Pressure transducer is autozeroed before each cycle.

Silent Deflation:
Continuous silent linear deflation

Liquid Crystal Display (LCD):
2 rows by 16 characters

Operator Control:
3-button control and LCD

Printer Specifications:
The QuietTrak ABP Monitor is also compatible with many other Epson compatible printers equipped with the following serial interface specifications:

9600 BAUD, 8 data bits, 1 stop bit, No parity checking. X-on/X-off handshaking is used.

The Report

The Tycos QuietTrak ABPM report consists of three or more pages. The actual size of the report will depend on the length of the ABP monitoring period and the number of readings taken. The report includes the following sections:

- Patient Information
- ABPM Parameter Settings
- Summary
- Hourly Averages
- Time Period Averages
- Readings Included in Averages
- Readings Excluded from Averages

The Sample Report

The basic format of the report is illustrated and detailed on the following pages.

* An optional IBM compatible computer program is available which provides custom report features, and full ABP monitor programming capabilities. The customized reports which are available with the program are not shown here. Ask your Welch Allyn/Tycos Dealer for more information.

Ambulatory Blood Pressure Report — The Heading Page

A The **Header** appears at the top of each page and identifies the date and time when the report is printed. The **Patient ID** is the patient's unique identifying number.

B **Patient Information** provides space for writing data such as patient name, address, phone number, age, sex, height, and weight.

Additional space is provided for medication, physician name, reason for test and comments.

C **ABPM Parameter Settings** list the settings programmed in the unit during this ABP monitoring procedure.

D The **Footer** identifies the serial number of the ABP monitor that took the readings and the current revision number of the ABP monitor's software as a reference. (It is 2.00, in this example.)

(Sample of ABPM Report, Page 1)

A
Header

DuietTrak Jan 28, 1993 11:57 AM Page 1
Ambulatory Blood Pressure Report Patient ID: 072 40 1003

Patient Name:_____ Age:_____

Address:_____ Sex:_____

_____ Height:_____

Phone Number:_____ Weight:_____

B
Patient Information

Medication:

Physician Name:_____

Reason for test:

Comments:

ABPM Parameter Settings

Maximum Inflation Pressure: 200 mmHg
Deflation Rate: 3 mmHg
Dynamic Pressure: On
1 Day Max: On
Start Button: On
Display: Off
Auto Dump: On

Time Periods:
09 AM to 11 PM: 15 minute interval
11 PM to 09 AM: 30 minute interval

Retry Parameters:

Systolic > 250	Diastolic > 160	Pulse Pressure > 150
Systolic < 60	Diastolic < 30	Pulse Pressure < 10
Sys Chg > 150	Dia Chg > 100	

C
ABPM Parameter Settings

Copyright (c) 1992 Tycos Instruments, Inc. 9212035292 2.00

D
Footer

Ambulatory Blood Pressure Report — The Data Summary

A **Summary** contains information about the Regular Run readings, including the time and date of the first and last attempted Regular Run readings.

❶ **Number of readings expected** includes all programmed and manual readings.

❷ **Number of readings used** is the number of accepted readings.

❸ **Minimum, Maximum, Average, Number of Systolic > 140 mmHg, Number of Diastolic Readings > 90:** These are calculated from the accepted Regular Run readings.

B **Hourly Averages** are presented in a table that includes data from the Regular Run readings for each of the 24 one-hour intervals in a day. If ABP monitoring was conducted for more than a one-day period, then the hourly averages include the values obtained during that hour for all days of use.

The table contains these values:

❶ **Hour** always begins on the hour (i.e., 07 AM) and ends after the last minute of the hour.

❷ **Num** is the number of Regular Runs taken during each one-hour period.

❸ **Sys** is the average Systolic value for each hour.

❹ **Dia** is the average Diastolic value for each hour.

❺ **HR** is the average heart rate value for each hour.

❻ The data is also represented graphically to the right of the data table. The average Systolic and Diastolic values are shown as "*", and the average heart rate values are indicated with an "0".

C **Time Period Averages** provide the calculated statistics from each ABP monitoring period.

QuietTrak Jan 28, 1993 11:57 AM Page 2
Ambulatory Blood Pressure Report Patient ID:072 40 1003

Summary

First reading on Jan 27, 1993 at 09:08 AM
Last reading on Jan 28, 1993 at 08:49 AM
Number of readings expected: 80
Number of readings used: 79 (99%)

	Systolic	Diastolic	Heart Rate
Minimum	91	49	43
Maximum	139	106	98
Average	118	73	67

Number of Systolic readings > 140 mmHg: 0 (0%)
Number of Diastolic readings > 90 mmHg: 4 (5%)

A Summary

Hourly Averages

❶ Hour	❷ Num	❸❹ Sys/Dia	❺ HR	❻ 40	65	90	115	140	165	190	215	240
09 AM	4	118/ 75	72		:O#--:	----:	#:	:	:	:	:	:
10 AM	4	110/ 76	64		O #--:	---#:	:	:	:	:	:	:
11 AM	4	116/ 72	60		O:	#---:	----#	:	:	:	:	:
12 PM	4	126/ 74	68		:O#--:	----:	-#	:	:	:	:	:
01 PM	4	129/ 87	81		: O#:	----:	--#	:	:	:	:	:
02 PM	4	117/ 71	75		:#O--:	----#	:	:	:	:	:	:
03 PM	4	123/ 83	73		: O #:	----:	-#	:	:	:	:	:
04 PM	4	119/ 81	67		O #-:	----:	#	:	:	:	:	:
05 PM	4	136/ 73	95		: #--:	O---:	---#	:	:	:	:	:
06 PM	4	122/ 90	77		: O #:	----:	#	:	:	:	:	:
07 PM	4	110/ 81	59		O: #-:	---#:	:	:	:	:	:	:
08 PM	4	126/ 74	71		:O#--:	----:	-#	:	:	:	:	:
09 PM	4	130/ 75	75		:O#--:	----:	--#	:	:	:	:	:
10 PM	4	132/ 73	66		O #--:	----:	--#	:	:	:	:	:
11 PM	3	125/ 82	59		O: #-:	----:	-#	:	:	:	:	:
12 AM	2	116/ 55	56		#O:	----:	----#	:	:	:	:	:
01 AM	2	99/ 53	56		#O:	----:	-#	:	:	:	:	:
02 AM	2	101/ 55	51		O#-:	----:	-#	:	:	:	:	:
03 AM	2	98/ 53	47		O #-:	----:	-#	:	:	:	:	:
04 AM	2	95/ 55	51		O#-:	----:	#	:	:	:	:	:
05 AM	2	94/ 59	49		O #:	----:	#	:	:	:	:	:
06 AM	3	98/ 62	53		O#:	----:	-#	:	:	:	:	:
07 AM	2	114/ 77	66		O #-:	----:	#	:	:	:	:	:
08 AM	3	118/ 75	71		:O#--:	----:	#	:	:	:	:	:

B Hourly Averages

Time Period Averages

Time Period	Num	Sys/Dia	HR	Sys>140	Dia>90	Sys>120	Dia>80
09 AM to 11 PM	56	122/ 77	72	0%	7%	55%	36%
11 PM to 09 AM	23	107/ 64	56	0%	0%	13%	13%

C Time Period Averages

# = Systolic & Diastolic Pressures
O = Heart Rate

Ambulatory Blood Pressure Report — The Readings

In the final page or pages of the report, results from each reading are listed separately. The length of the final report section varies with the total number of readings that were taken. (The example shown here was shortened so that each part can be explained on one page.)

Readings Included in Averages. The data from each reading are provided, including the day (❶), time (❷), Systolic and Diastolic pressures (❸), heart rate (❹), and an initiation code (❺) designating which type of reading was taken.

❻ The data are also presented graphically for convenient reference.

(Sample of ABPM Report, Page 3)

QuietTrak Jan 28, 1993 11:57 AM Page 3
Ambulatory Blood Pressure Report Patient ID: 072 40 1003

Readings Included in Averages

❶ Day	❷ Time	❸ Sys/Dia	❹ HR	❺ Code	40	65	❻ 90	115	140	165	190	215	240
27	07:00 AM	125/ 83	90	a			#0----:	-#					
27	07:15 AM	120/ 89	89				0#---:	----:	#				
27	07:30 AM	113/ 85	87				#0---:	----#					
27	07:45 AM	115/ 81	83				0 #-:	----#					
27	10:00 AM	113/ 78	89				:0#--:	----#					
27	10:15 AM	101/ 70	80			0:	#---:	-#					
27	10:30 AM	116/ 85	78				:0 #:	----#					
27	10:45 AM	111/ 73	56			0 :	#--:	---#:					
27	11:00 AM	115/ 73	58			0:	#--:	----#					
27	11:15 AM	118/ 78	63			0	#-:	----:	#				
27	11:30 AM	113/ 68	56			0 :	#---:	----#					
27	11:45 AM	119/ 67	63			0#-	----:	----:	#				
27	12:00 PM	135/ 83	76				#-0--:	----:	---#:				
27	12:15 PM	111/ 71	57			0 :	#---:	---#:					
27	12:30 PM	134/ 79	59			0:	#-:	----:	---#:				
27	12:45 PM	124/ 82	80				: 0#-:	----:	-#				
27	01:00 PM	130/106	76				: 0 :	#-:	--#:				
27	01:15 PM	139/ 90	91					#0---:	----#				
27	01:30 PM	132/ 84	92				: #0----:	--#					
27	01:45 PM	115/ 68	66				0#---:	----#					
27	02:00 PM	114/ 68	72				:#0--:	----#					
27	02:15 PM	107/ 61	65			#0	----:	--#					
27	02:30 PM	120/ 74	78				: #0-:	----:	#				
27	02:45 PM	127/ 81	85				: #0:	----:	-#				
27	03:00 PM	133/ 93	83				: 0:	#---:	---#:				
27	03:15 PM	125/ 85	75				: 0 #:	----:	-#				
27	03:30 PM	113/ 73	63				0 #--:	----#					
27	03:45 PM	121/ 81	71				:0 #-:	----:	#				
27	04:00 PM	115/ 77	63				0 #--:	----#					
27	04:15 PM	123/ 85	71				:0 #:	----:	-#				
27	04:30 PM	113/ 75	61			0:	#--:	----#					
27	04:45 PM	125/ 87	73				: 0 #:	----:	-#				
27	05:00 PM	137/ 74	96				: #--:	0---:	---#:				
27	05:15 PM	133/ 70	92				:#---:	0---:	---#:				
27	05:30 PM	135/ 72	94				:#---:	0---:	---#:				
27	05:45 PM	139/ 76	98				: #--:	-0--:	----#				
27	06:00 PM	129/ 97	84				: 0:	#---:	--#				
27	06:15 PM	126/ 92	79				: 0 #:	----:	-#				
27	06:30 PM	115/ 83	70				:0 #:	----#					
27	06:45 PM	120/ 88	75				: 0 #:	----:	#				
27	07:00 PM	115/ 86	61			0:	#:	----#					
27	07:19 PM	105/ 76	59	r		0:	#--:	--#					
27	07:30 PM	108/ 79	57			0 :	#-:	---#:					
27	07:45 PM	112/ 83	59			0:	#:	---#:					
27	08:00 PM	124/ 72	69				0#---:	----:	-#				
27	08:15 PM	131/ 79	76				: 0#-:	----:	--#				
27	08:30 PM	128/ 76	73				:0#--:	----:	--#				
27	08:45 PM	121/ 69	66				0#---:	----:	#				
27	09:00 PM	130/ 75	75				:0#--:	----:	--#				
27	09:15 PM	136/ 81	81				: 0#-:	----:	---#:				
27	09:30 PM	124/ 69	69				0#---:	----:	-#				
27	09:45 PM	130/ 75	75				:0#--:	----:	--#				

— — — — — — Data Continued on Next Page — — — — — —

A **Initiation Codes.** Initiation code explanations are listed below the table of included readings.

B **Readings Excluded from Averages.** The data from any excluded readings are presented in this table with the error code or retry reason code.

C **Error Codes** Error code explanations are listed below the table of excluded readings.

QuietTrak Jan 28, 1993 11:57 AM Page 4
Ambulatory Blood Pressure Report Patient ID:072 40 1003

Day	Time	Sys/Dia	HR	Code	40	65	90	115	140	165	190	215	240
27	10:00 PM	139/ 80	73				O*		*				
27	10:15 PM	130/ 71	64				O*		*				
27	10:30 PM	134/ 75	68				O*		*				
27	10:45 PM	125/ 67	59				O*		*				
27	11:00 PM	129/ 86	63				O	*	*				
27	11:18 PM	125/ 82	59	e			O	*	*				
27	11:30 PM	121/ 78	55			O	*	*					
28	12:00 AM	120/ 59	60				*O		*				
28	12:30 AM	112/ 51	52			*O			*				
28	01:00 AM	101/ 55	56			*O			*				
28	01:30 AM	97/ 51	52			*O			*				
28	02:00 AM	100/ 54	50			O*			*				
28	02:30 AM	102/ 56	52			O*			*				
28	03:00 AM	102/ 57	51			O*			*				
28	03:30 AM	94/ 49	43			O*			*				
28	04:00 AM	97/ 57	53			O*			*				
28	04:30 AM	93/ 53	49			O*			*				
28	05:00 AM	91/ 56	46		O	*							
28	05:30 AM	97/ 62	52			O	*						
28	06:00 AM	92/ 57	47		O	*							
28	06:30 AM	96/ 61	51			O	*						
28	06:42 AM	105/ 67	60	e			O*		*				
28	07:00 AM	110/ 71	64				O*		*				
28	07:30 AM	117/ 82	68				O	*	*				
28	08:00 AM	114/ 75	71				O*		*				
28	08:30 AM	121/ 79	68				O	*	*				
28	08:49 AM	118/ 72	74	e			*O		*				

Initiation Codes
  = Timer initiated this reading
e = Start Button initiated this reading
r = Auto Retry initiated this reading
o = Office Reading

A Initiation Codes

Readings Excluded from Averages

Day	Time	Sys/Dia	HR	Code	Reason
27	09:01 AM	114/ 71	70	o	
27	09:01 AM	134/ 70	69	o	
27	09:04 AM	116/ 68	73	o	
27	09:08 AM	0/ 0	0	e	01
27	06:00 PM	0/ 0	0		13
27	07:19 PM	88/ 87	67		Pulse Pressure > 150

B Readings Excluded from Averages

Error Codes
01: Stop Button pressed
02: Cuff disconnected, cuff too loose, or major air leak
03: Power Failure
04: Autozero Failure
05: Reached target pressure to quickly
06: Over Pressure detected

C Error Codes

– – – – – – Error Codes Continued on Next Page – – – –

(Sample of ABPM Report, Page 5)

07: Over 10mm for 180 seconds
08: Too much artifact, excessive arm movement
09: No K-sounds detected (microphone may be out of position)
10: K-sounds too weak
11: K-sounds too strong
12: Blood Pressure out of system range
13: Systolic too close to target pressure

Getting Started 2

This section identifies all of the product components included with the Tycos QuietTrak Ambulatory Blood Pressure Monitor. You will learn about the control keys of the ABP monitor and setup basics so that you can get started using the ABP monitor.

Page	Topic
2-2	Unpacking Checklist
2-4	Features at a Glance
2-7	Battery Requirements
2-8	Loading the Batteries
2-9	The Power-On Self-Test
2-10	Setting Date & Time

Unpacking Checklist

After you have unpacked the Tycos QuietTrak ABPM and the components, identify each item with the checklist that follows and inspect for missing items. Retain the shipping materials in case of shipping damage or for return, if necessary, to Welch Allyn/Tycos for repair or warranty service.

Content Checklist

A Tycos QuietTrak ABPM: The Tycos QuietTrak ABPM is a compact, lightweight unit that is carried in a pouch and worn by the patient during the ABP monitoring period.

B Operator Manual: (This manual) Review and save this helpful product reference.

C ABP monitor Pouch: The pouch covers the ABP monitor and adapts to either a belt, worn at the patient's waist, or a shoulder strap.

D Belt and Shoulder Straps: (One each) Adjustable to a wide range of sizes.

E Medium Cuff with Bladder: (One each)

F Large Cuff with Bladder: (One each)

G Microphone and Pneumatic Assembly: (One each) Comes pre-connected to the Medium size cuff with bladder.

H Batteries: (Five sets) Four AAA batteries are required for each ABP monitoring procedure.

I Hookup Kits: (Five each) Each kit includes Patient Diary, microphone anchoring pad, and cuff anchoring pad.

J Cuff Anchoring Straps: (Three each) The straps stabilize the cuff during the ABP monitoring period.

K Calibration T-connector: (One each) Allows connection of Tycos QuietTrak ABPM to standard sphygmomanometer for calibration check and simultaneous arm measurement.

L Instrument Warranty Card: Fill this out today and return it to the Welch Allyn/Tycos Service Center. This card validates your warranty.

M QuietTrak ABPM Carrying Case: (One each)

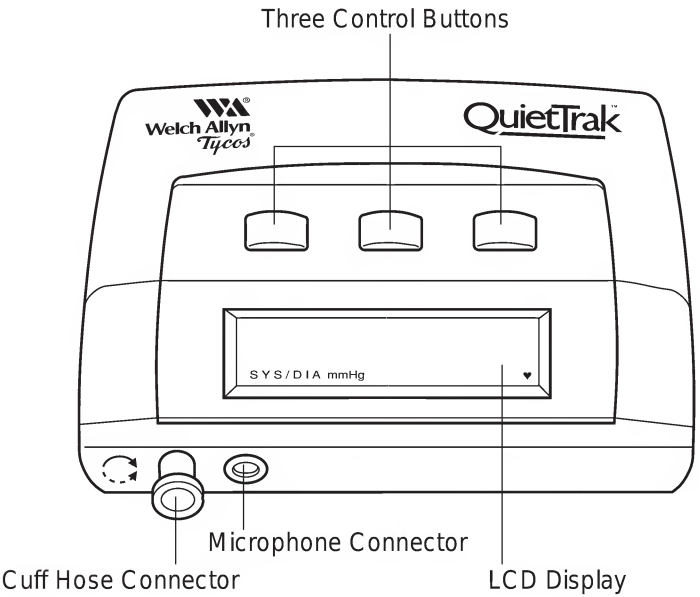
Note: Report any signs of shipping damage to the carrier. If an item is missing or damaged, contact the Welch Allyn/Tycos Service Center nearest you, or your distributor.

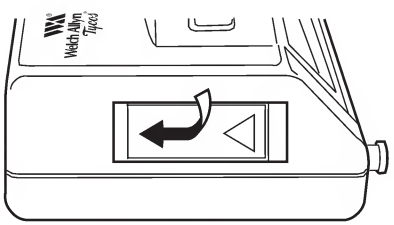
Features at a Glance

The uncomplicated design of the Tycos QuietTrak ABPM is one of its best features. There are only a few parts to learn.

ABP monitor Anatomy

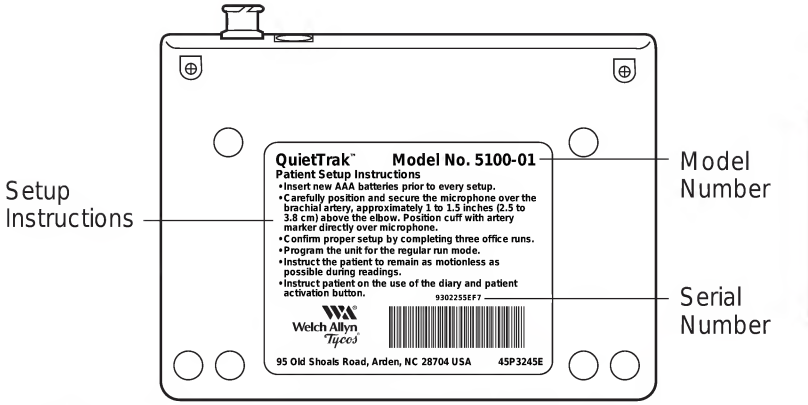
Top/Front View of the Tycos ABP Monitor. The three control buttons, LCD (liquid crystal display), cuff hose connector, and the microphone connector are shown here.



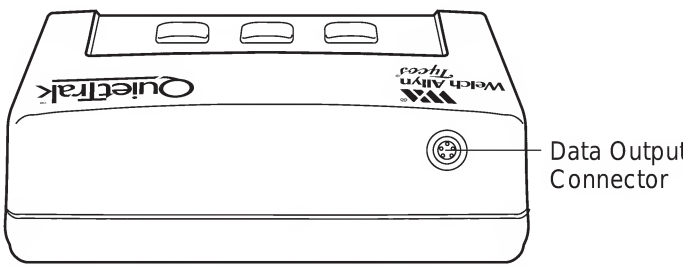


Side View of the Tycos QuietTrak ABPM. To open the battery compartment, apply gentle pressure with your finger and slide the door in the direction of the arrow. The door will unlatch and open.

To close the door, first press the door closed while sliding it in the direction of the arrow. Once the door is flush with the ABP monitor, allow the door to spring back in the opposite direction to latch.


Setup
Instructions
QuietTrak™ Model No. 5100-01
Patient Setup Instructions
•Insert new AAA batteries prior to every setup.
•Carefully position and secure the microphone over the brachial artery, approximately 1 to 1.5 inches (2.5 to 3.8 cm) above the elbow. Position cuff with artery marker directly over microphone.
•Confirm proper setup by completing three office runs.
•Program the unit for the regular run mode.
•Instruct the patient to remain as motionless as possible during readings.
•Instruct patient on the use of the diary and patient activation button.
9302255EF7
Welch Allyn
Tycos
95 Old Shoals Road, Arden, NC 28704 USA 45P3245E
Model
Number
Serial
Number

Bottom View of the Tycos QuietTrak ABPM. The label on the bottom of the ABP monitor lists the model number, serial number and a summary of setup instructions.



Back View of the Tycos QuietTrak ABPM. The connector on the back of the ABP monitor is for data output to a printer or an optional PC interface.

Turning the ABP Monitor's Power On or Off

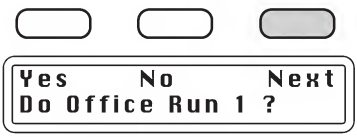
There is no On/Off switch to operate. The ABP monitor is On when batteries are loaded and Off when the batteries are removed.

Description of Control Buttons

The Tycos QuietTrak ABPM has only three buttons, but with them, the operator can:

- Set the date and time
- Enter patient data
- Choose programming features
- Retrieve the ABP monitoring data.

What each button does depends on the command or choice that is shown on the display screen beneath it.



Three-Button Control. You will press a button to respond to a message on the display screen.

The Display Screen. The bottom line of the display screen provides a question or message, while the top line of the display offers choices. The buttons correspond with the choices.

Battery Requirements

Replace Batteries for Every Patient Study.

Install four new AAA alkaline batteries prior to each patient hookup. Fresh batteries provide the power to inflate the arm cuff 100-300 times during a one- or multi-day period. For maximum ABP monitoring periods, fresh batteries are required.

If the ABP monitor reaches a low battery state, it automatically discontinues the measurement cycle to reserve the power it will later need to transfer the data. Partially-used batteries shorten the ABP monitoring session. Therefore, attempting an ABP monitoring session with used batteries is not recommended.

! **Data Storage Protection:** An internal battery of the Tycos QuietTrak ABPM powers the data's memory storage and protects the data even if the AAA batteries wear down. Data is preserved even during battery replacement.

! **Concerning the Use of Rechargeable Batteries:** Rechargeable NiCad batteries can be used in place of alkaline batteries. With fully-charged NiCad batteries, 100 measurement cycles are achievable with average case usage (Medium size cuff and 180 mmHg average inflation level). The length of the ABP monitoring session could vary with different cuff sizes or with batteries which are not fully charged.

Remove the Batteries to Store the ABP monitor.

At the conclusion of an ABPM procedure, we recommend that you print the report and remove the used batteries from the unit. This will eliminate the risk of attempting a new patient study with used batteries. If you want to wait to print the report at a later time, go ahead and remove the batteries; the internal lithium battery will retain all patient data until you retrieve it or intentionally erase the data.

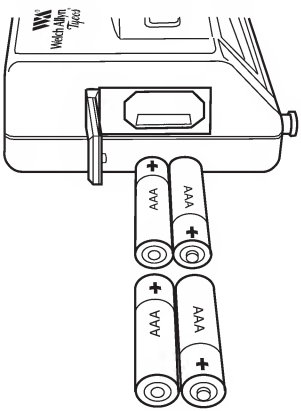
Internal Battery

An internal lithium battery powers the time, date, parameters, and data retention for at least five years. The internal battery ensures that the ABP monitor won't lose data when you remove or replace the AAA batteries.

When the internal battery needs replacement, return the ABP monitor to the nearest Welch Allyn/Tycos Service Center.

Loading the Batteries

If batteries were previously loaded, remove them now. Open the battery compartment, tilt the ABP monitor, and slide the used batteries into your hand. Keep the used batteries separate from your fresh battery supply so that you don't accidentally re-insert them into the ABP monitor. (Dispose of the used batteries according to local regulations.)

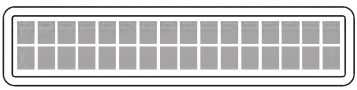


Slide two fresh batteries, tab end out, into the battery chamber illustrated with a battery tab. Slide the two remaining fresh batteries, flat end out, into the battery chamber illustrated with a flat end of a battery. Close the battery compartment door.

After powering up, the ABP monitor will briefly display a sequence of messages as it performs a Self-Test of its functions.

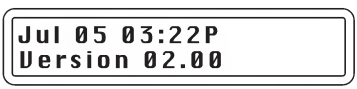
The Power-On Self-Test

The Tycos QuietTrak Ambulatory Blood Pressure Monitor checks itself each time the battery door is closed. Five Self-Test messages appear quickly in sequence, and then the ABP monitor pauses to wait for a command. Each Self-Test message is shown and explained here.

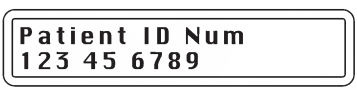


LCD Test: This is a quick visual test for the operator. If all elements of the LCD are working, a grid pattern appears.

Autozeroing: The ABP monitor checks the pressure sensor and ensures that the starting point is at zero pressure.



Date/Time/Version: Today's date, the current time, and the software version of the ABP monitor appear briefly.



Patient ID: The patient number identifies the patient data currently stored in memory.

BP Readings: The ABP monitor displays the number of blood pressure readings currently stored in memory.

Error Messages

?

If the ABP monitor's Self-Test fails, an error message appears. The **Troubleshooting Guide** in Section 7 explains each message and offers guidance.

The ABP Monitor is Ready

After completing a Self-Test, the ABP monitor pauses and waits for a command.

Setting Date & Time

You should only need to set the date and time when you first receive your Tycos QuietTrak Ambulatory Blood Pressure Monitor, or after the internal battery is replaced. After the date and time have been set, the internal battery keeps the clock and calendar running.

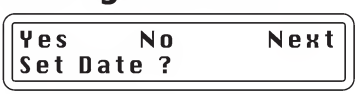
To set the date and time, or to recheck that the settings are correct, proceed as follows:

> **!** Always check the date and time settings prior to patient hookup, and before any readings have been taken.

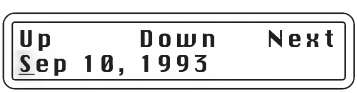
Set Patient ID ? This message will appear if there are no patient readings currently stored in the unit's memory. In this case, you are clear to proceed with setting the date and time. Respond with **No** to this question by pressing the middle button.

The display will change to **Set Date ?** and you can proceed to Setting the Date.

Setting the Date



To set the date, press **Yes** in response to the **Set Date ?** message. A new message will appear.



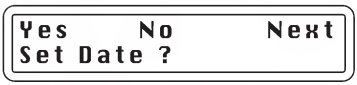
The new display shows today's date, and a cursor highlights the month.

If the month is correct, press **Next** to move the cursor to the next field.

OR

If the month is incorrect, press **Up** or **Down** to rotate through the calendar and select the correct month. When the correct month is showing, move the cursor to the next field by pressing **Next**.

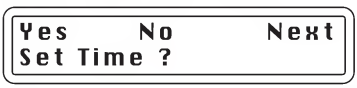
After setting the month, set the day and then the year. Press **Next** to return to the **Set Date ?** display.



You've just set the date, so press **Next** to proceed.

(Or, press **Yes** if you want to review what you just did or re-set the date.)

Setting the Time



Setting the time works like setting the date. Press **Yes** to set the time.

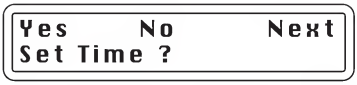
The display shows the current time, and a cursor highlights the hour (**11:08PM**).

If the hour shown is correct, press **Next** to move the cursor to the minutes.

OR

If the hour is incorrect, press **Up** or **Down** to move to a later or earlier hour. When the hour is correct, press **Next** to move the cursor to the minutes.

After setting the hour, set the minutes. Press **Next** to return to the **Set Time ?** menu.



Press **Next** if you would like to continue using the ABP monitor.

(Or, Press **Yes** if you want to set the time again, or review what you just did.)

?

If the displayed date and time do not remain current in subsequent ABP monitor use, then the internal lithium battery may need replacement. Refer to Section 7 for trouble-shooting help.

Some suggestions for continued learning:

- Review the ABP monitor's programmable options in **Choosing Program Options**, Section 3,
- Learn how to use the ABP monitor in **Patient Hookup**, Section 4.

Choosing Program Options 3

This section introduces the programmable parameters of the Tycos QuietTrak Ambulatory Blood Pressure Monitor, and explains step-by-step how to select them.

Flow charts illustrate the programming sequences, and can be used like road maps as you review or change the program of the ABP monitor.

The last page of the section provides space to record your programming selections for future reference.

Page	Topic
3-2	Overview of Program Options
3-7	Basic Parameters — Step-By-Step Programming
3-15	Advanced Parameters — Step-by-Step Programming
3-19	Special Parameters — Step-by-Step Programming
3-23	Flow Charts for Parameter Programming
3-27	Office Record of Program Selections

Overview of Program Options

The Tycos QuietTrak ABPM is designed with flexible program options (parameters) to fit typical needs, as well as special clinical cases so you can adapt the ABP monitor to your needs. There are three groupings of parameters.

Basic Parameters typically are reviewed and modified from one ABP monitoring procedure to the next, customized to the patient's needs or the type of study being done.

Advanced Parameters specify the deflation rate of the cuff, turn the dynamic pressure feature On or Off, and define the criteria for identifying data that fall outside specified levels (retry parameters).

*

The Advanced Parameters are preset at values optimum for most clinical conditions. To ensure maximum performance of the ABP monitor during typical procedures, use the default settings.

Special Parameters establish the routine of the ABP monitoring procedure, such as the format in which time is displayed, and the language of the ABP monitor's messages. Generally, these remain the same from one procedure to the next, unless there is a specialized procedural need.

*

Concerning Defaults: A default is the setting the ABP monitor has as it arrives from the factory. Each parameter has a default. If you change a parameter, your selection is continually stored by the ABP monitor's internal memory until it is changed again or until the internal battery fails.

If your ABP monitor is serviced at a service center, the ABP monitor would probably be returned to you with the default settings. For that reason, we suggest you keep a record of your selections. Space is provided at the end of this section to write down your parameter settings.

Basic Parameters — Overview

Basic Parameters give you flexibility to customize the ABP monitoring periods and frequency of measurements to the patient's routine. The Basic Parameters let you decide whether or not you want the patient to activate readings or see the blood pressure measurements on the display. And, the maximum cuff inflation pressure can be set in the Basic Parameters.

Because these parameters often vary from patient to patient, they are easy to review and change in the Basic Parameters.

Number of periods

Number of ABP monitoring periods; can be 1, 2, 3, or 4. Default is 2.

Beginning Time

Time of day when each period begins. Default is 7 a.m. for first period, 11 p.m. for second.

Interval

Interval of automatic measurements taken during each period. Interval is determined by the length of time between readings. Options: Manual, 5, 10, 15, 20, 30, 60, or 120 minutes. Default is 15 for first period; 30 minutes for second period.

Maximum Pressure

Maximum cuff inflation pressure, selectable in 10 mmHg increments within 160-270 range. Default is 200.

Display

Turn measurement readings On or Off to patient's view. Default is On.

Patient Activation Button

Patient Activation Button allows the patient to initiate a measurement with the push of a button. Turn button On or Off. Default is On.

Advanced Parameters — Overview

The Advanced Parameters specify the deflation rate of the cuff, turn the dynamic pressure feature On or Off, and define the criteria for identifying data that fall outside specified levels. These parameters are adaptable when needed for specialized studies.

The Advanced Parameters are preset at values optimum for most clinical conditions. To ensure maximum performance of the ABP monitor during typical procedures, use the default settings.

Deflation Rate

Set deflation rate of cuff. Unit of measure is mmHg/second until pulse rate is detected, after which it becomes mmHg/heartbeat. Range is 2-6. Default is 3.

Dynamic Pressure

Turn dynamic pressure function On or Off. If On, cuff inflates to a pressure of 30 mmHg greater pressure than the previous Systolic measurement, otherwise, unit inflates to Maximum Inflation Pressure. Default is On.

Retry Parameters

The following retry parameters allow you to set boundaries for acceptable measurements. If one or more of the boundaries is violated, the unit will automatically trigger a retry reading. The purpose of the retry parameters is to identify and reject readings which are beyond the scope of "believable", and do not reflect a true blood pressure measurement. A new reading will then be taken to replace the unacceptable data.

Max Allowable Systolic Pressure

Maximum allowable Systolic pressure can be set from 60-250 mmHg in increments of 10. Pressures exceeding this generate a retry request. Default is 250.

Min Allowable Systolic Pressure

Minimum allowable Systolic pressure can be set from 60-240 mmHg in increments of 10. Pressures below this generate a retry request. Default is 60.

Max Allowable Change in Systolic Pressure

Maximum allowable change in Systolic pressure from one valid reading to the next can be set from 30-150 mmHg in increments of 10. Systolic pressure changes exceeding this generate a retry request. Default is 150.

Max Allowable Diastolic Pressure

Maximum allowable Diastolic pressure can be set from 40-160 mmHg in increments of 10. Pressures exceeding this generate a retry request. Default is 160.

Min Allowable Diastolic Pressure

Minimum allowable Diastolic pressure is selectable from 30-160 mmHg in increments of 10. Pressures below this generate a retry request. Default is 30.

Max Allowable Change in Diastolic Pressure

Maximum allowable change in Diastolic pressure from one valid reading to next can be set from 20-100 mmHg in increments of 10. Changes exceeding this level generate a retry request. Default is 100.

Max Allowable Pulse Pressure

Maximum allowable pulse pressure (difference between Systolic and Diastolic pressures) is selectable from 10-150 mmHg in increments of 10. Default is 150.

Min Allowable Pulse Pressure

Minimum allowable pulse pressure is selectable from 10-150 mmHg in increments of 10. Default is 10.

Special Parameters — Overview

With the Special Parameters, you select your preference for the time format, the ABP monitor's language, and the maximum length of the ABP monitoring period. You probably won't change these parameters from one procedure to the next.

For best results, we recommend that the Auto Dump feature be left On unless there is a specialized procedural need to turn it Off.

ABP Monitor Language

This specifies the language used in ABP monitor's display. Languages available are: English, Italian, French, German and Spanish. Default is English.

Time Display

Time can be represented as a.m./p.m. time, or 24-hour time. Default is a.m./p.m.

Auto Dump

If Auto Dump feature is On, the cuff rapidly deflates at 20 mmHg below the Diastolic pressure. If Off, slow deflation continues until the cuff pressure is only 20 mmHg. This allows simultaneous same-arm efficacy studies. Default is On.

One Day Maximum

If One Day Maximum is On, the ABP monitor will discontinue taking measurements (automatic and patient-activated) when 24 hours have elapsed from the first Regular Run measurement. The default is On.

Basic Parameters — Step-By-Step Programming

The following information will guide you step-by-step in selecting the Basic Parameters.

Ready the ABP Monitor

Load four new AAA batteries into the ABP monitor and wait as the ABP monitor completes its Self-Test.

One of three messages appears following the Self-Test. The message that comes up reflects what the ABP monitor was doing when it was last used.

One of Three Messages Appears Following the Self-Test:

Set Patient ID ? This message will appear if there are no patient readings currently stored in the unit's memory. In this case, you are clear to proceed with setting the Basic Parameters.

Review Data ? This message will appear if data from a patient study remains in memory. The data will remain in the memory until it is intentionally erased.

Resume Readings ? This message will appear if a 24-hour ABP monitoring period has been interrupted. Most often this would occur if a patient removes the batteries, or opens and closes the battery door, during the 24-hour period.

This message will be displayed for one minute. If no commands are made, the unit will automatically resume the Regular Run cycles.

!

If the **Review Data ?** or **Resume Readings ?** messages appear following the Self-Test, it will be necessary to erase existing Regular Run patient data from memory prior to changing the Basic Parameters. Refer to Section 4, page 4-5 for instructions.

You are allowed to change Basic Parameters if only Office Run data is stored.

Once you have printed out and erased any existing Regular Run data from memory, you can proceed with programming the Basic Parameters:

Set Patient ID ? Respond with **No** to this question by pressing the middle button. Then answer the sequence of questions that follow as indicated here:

Set Date ? Choose **No**.

Set Time ? Choose **No**.

The display will change to **Set Parameters ?** and you can proceed to Reviewing or Selecting Basic Parameters.

Reviewing or Selecting Basic Parameters

Hint: If you lose your place and need help getting back on track, you can press either the **No** or **Next** buttons multiple times until you see **Set Parameters ?** in the display.

OR

The Basic Parameter Flow chart provides a helpful diagram of the sequence of displays, and can be used like a road map. See page 3-24.

Set Parameters ? When this display appears, you are ready to review current parameter settings and either accept them or change them.

To review the first parameter, respond with **Yes** by pressing the left button. The display will change to the **Set Periods ?** message.

The Set Periods Parameter

Set Periods ? This allows you to select the number of ABP monitoring periods (**1**, **2**, **3**, or **4**), define when those periods begin, and select the frequency of the automatic blood pressure measurements taken during each period.

To omit setting the periods and go on to the next Basic Parameter, press **No** or **Next** and proceed to Setting the Maximum Pressure further in this section,

OR

Press **Yes** to review or change the periods.

Reviewing or Selecting the Number of Periods. This allows you to select the number of ABP monitoring periods (**1**, **2**, **3**, or **4**). **2** is the default setting and means that two ABP monitoring periods are selected.

2 is a good choice if you plan to vary the frequency of measurements during two periods, such as daytime and nighttime, or working hours and non-working hours.

3 and **4** periods give you even more flexibility to customize the periods to the patient's day: at home, at work, during leisure, and during sleep.

Select **1** period if you want an unchanging rate of automatic measurement.

Selecting the Number of Periods. To change the number shown on the ABP monitor's display, press the **Up** or **Down** buttons to rotate through the sequence of **1** to **4**. (When you reach the last number of the sequence, the sequence rolls over to the first number.)

When the number of periods you want to select is displayed, press **Next** to accept the number. The message will change.

Defining Each Period. You will need to define the ABP monitoring periods selected. First, you will set the beginning time of the period, then you will enter the time interval between blood pressure measurements taken automatically during that period.

Setting the Beginning Time of the Period. A cursor highlights the beginning time for the first period, **Prd 1**. Period 1 is customarily set at the patient's normal waking time. The default setting for the beginning time is shown here in a.m./p.m. The end time of a period is automatically determined by the start time of the next period.

Note: Time can be presented as a.m./p.m. or as 24-hour time. This is an option in Special Parameters, covered later in this section.

To adjust the period's beginning time for Period 1, press the **Up** or **Down** buttons to move in one-hour increments to a later or earlier time.

Note: Period 1 always specifies the start time of the report.

To accept the time currently shown, press **Next**. The cursor will move to highlight the next field, the frequency setting.

Setting Measurement Frequency/First Period. Measurement frequency is the time interval, in minutes, between automatic readings. The choices are: **MAN**ual, **5**, **10**, **15**, **20**, **30**, **60**, or **120** minutes.

The default for the first period is **15**. That means that the ABP monitor will initiate a blood pressure measurement every 15-minute interval during this period.

If **MAN** (manually-requested readings) is chosen, the automatic measurements are cancelled during the period, but the patient can initiate measurements by pressing the Patient Activation Button (if the patient activation button is not turned off).

To select the frequency of measurements, press the **Up** or **Down** button to move through the sequence until the one you want appears.

After selecting the measurement frequency, or if you want to accept the frequency currently shown, press **Next**.

Setting Measurement Frequency/Next Period(s). If two or more ABP monitoring periods were selected, then the second period will be displayed.

Define this period and any others selected by following the same steps you used with the first period.

Repeat the same steps to define the third and fourth periods, if needed.

Note: If the **Up** or **Down** button seems to be frozen because the time won't change, you may be trying to select the beginning time of a previous period. A design feature prevents the periods from overlapping.

Setting the Maximum Pressure. This determines the maximum cuff inflation pressure, selectable in 10 mmHg increments within a range of 160-270 mmHg. The ABP monitor will never inflate above this setting.

Reducing the maximum cuff pressure to match the patient's upper range more closely is a comfort benefit to the patient. However, be careful not to set the maximum too low, so that normal blood pressure fluctuations cannot be accommodated. The Dynamic Pressure feature (page 3-18), if utilized, will automatically adjust the inflation level to track the patient's previous Systolic measurements. This will enhance patient comfort.

To change the pressure, press the **Up** or **Down** buttons and scroll through the pressures until the desired one appears.

Press **Next** to accept the displayed pressure.

Turning the Display On or Off. This turns the ABP monitor's display of blood pressure readings **On** so they are visible to the patient, or **Off** so the patient does not see them.

Some patients may react to seeing their blood pressure readings and this could affect their results. For other patients, having the measurements visible may be a tool to better understand their health and to gain compliance with taking medication. The choice to display or not display may be a one-time decision to suit the clinical practice, or it can be decided patient-to-patient.

* **Note:** Even if the display is Off, the Office Runs (test measurements) that follow the patient hookup will be displayed, and date and time will be displayed throughout the ABP monitoring period.

Press **On** or **Off** according to your display preference. Then, press **Next**.

Turning the Patient Activation Button On or Off. If On, the patient can initiate a blood pressure measurement by pressing the green button. If Off, the patient cannot initiate readings, and only the programmed readings are taken.

By pressing the green Patient Activation Button, the patient can cancel a measurement attempt. This feature is available even if the Patient Activation Button is Off. Normal operation will resume at the next programmed cycle time.

The Patient Activation Button can be a helpful tool with a patient who experiences transient symptoms. The patient can activate a measurement during the symptom if this feature is On. Special studies may call for measurements taken only at specified intervals, so the Patient Activation Button can be turned Off.

Press **On** or **Off** according to your preference. Then, press **Next**.

When you have completed reviewing or selecting the Basic Parameters, you can continue with the Advanced Parameters, or you can exit the parameter program.

> If you are going to quit now, remove and dispose of the AAA batteries before storage so that no one attempts an ABP monitoring period with used batteries.

OR

To exit now and return to the main menu, press **Next** in response to **Set Adv Param ?**, then press **Next** again in response to **Set Param ?**

OR

To review the Advanced Parameters, press **Yes** in response to **Set Adv Param ?** and continue on to the next page.

Advanced Parameters — Step-by-Step Programming

The Advanced Parameters make it possible to adapt the ABP monitor to very specialized studies. However, to ensure maximum performance in typical procedures do not change the defaults.

Reviewing or Selecting Advanced Parameters. At this display, you are ready to review the Advanced Parameter settings and accept or change them.

To review the first one, press **Yes**.

* The flow chart of Advanced Parameter Programming is an optional reference that might be helpful as you work through the display sequence. See page 3-25.

Setting the Deflation Rate. This determines the deflation rate of the blood pressure cuff. The unit of measure is mmHg per second until pulse rate detection, after which it becomes mmHg per heartbeat.

The range of rates is 2-6. The default setting is 3, and recommended for best results.

Press **Up** or **Down** to raise or lower the rate. When the desired rate appears on the display, press **Next** to accept it and continue.

The Retry Parameters

Set Retry Param ? The Retry Parameters set criteria for identifying inaccurate measurement data. When a measurement meets the criteria, the ABP monitor attempts to retry the measurement.

There are eight Retry Parameters to review and accept or change. The directions apply to all eight parameters. Each Retry Parameter is defined in the same sequence as it will appear on the display.

Selecting the Eight Retry Parameters. For each of the Retry Parameter displays, press **Up** or **Down** to raise or lower the setting. When the desired setting is shown in the display, press **Next** to accept it and continue to the next.

The **Maximum Allowable Systolic Pressure** can be set from 60-250 mmHg in increments of 10. The default is 250.

The **Minimum Allowable Systolic Pressure** can be set from 60-240 mmHg in increments of 10. The default is 60.

The **Maximum Allowable Change in Systolic Pressure** from one valid reading to the next can be set from 30-150 mmHg in increments of 10. The default is 150.

The **Maximum Allowable Diastolic Pressure** can range from 40-160 mmHg in increments of 10. The default is 160.

The **Minimum Allowable Diastolic Pressure** is selectable from 30-160 mmHg in increments of 10. The default is 30.

The **Maximum Allowable Change in Diastolic Pressure** from one valid reading to the next ranges from 20-100 mmHg in increments of 10. The default is 100.

The **Maximum Allowable Pulse Pressure** (pulse pressure is the difference between Systolic and Diastolic pressures) is selectable from 10-150 mmHg in increments of 10. The default is 150.

The **Minimum Allowable Pulse Pressure** is selectable from 10-150 mmHg in increments of 10. The default is 10.

Completing the Retry Parameters. When the last Retry Parameter is selected and this display appears, the Retry Parameters are completed.

* Error codes 2, 4, 5, 8, 9, 10, 11, 12 and 13 will cause the ABP monitor to attempt a retry reading. For Manual and period intervals of 5 minutes, there are no retries. For period intervals of 10, 15 or 20 minutes, there is a maximum of one retry per error. For period intervals of 30, 60 and 120 minutes, there is a maximum of two retries.

Press **Next** to complete the one remaining Advanced Parameter.

Setting the Dynamic Pressure. If the Dynamic Pressure is turned **On**, the ABP monitor will inflate the cuff to 30 mmHg greater pressure than the previous Systolic measurement. This will enhance patient comfort. If **Off**, the cuff will inflate to the specified Maximum Inflation Pressure for every measurement. The default is On.

Make your selection and then press **Next** to accept it.

Completing the Advanced Parameters. When you have completed reviewing or selecting the Advanced Parameters, you can exit the parameter program and return to the main menu to begin a patient hookup.

To quit using the ABP monitor, simply remove the batteries and put it away; there is no Off switch.

! If you are going to quit now, remove and dispose of the AAA batteries and store the ABP monitor empty, so that no one attempts an ABP monitoring period with used batteries.

OR

To exit now and return to the main menu, press **Next** in response to **Set Adv Param ?**, then press **Next** again in response to **Set Param ?**

OR

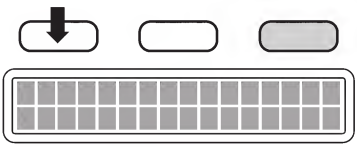
To review the Special Parameters, continue on to the next page.

Special Parameters — Step-by-Step Programming

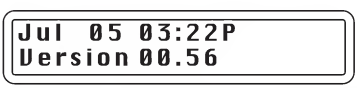
The Special Parameters establish the routine of the ABP monitoring procedure, such as the time format, the ABP monitor's language, and the maximum length of the ABP monitoring period. After your initial selection, you probably won't need to change these parameters from one procedure to the next.

Readying the ABP Monitor. The Special Parameters are not found in the ABP monitor's main menu, but are easily accessible.

To get to the Special Parameters, load four AAA batteries (or just open the battery compartment if the batteries are already loaded) and close the battery compartment.



As the ABP monitor begins its Self-Test, press the left button and hold it down.



Continue holding the button down until the date/time/version display disappears and the **Change Language ?** menu appears. Now release the button.

The ABP monitor display shows the first of the Special Parameters, **Change Language ?** You are now ready to review and select the Special Parameters.

* The flow chart of Special Parameter Programming might be a useful reference as you work through the reviewing and selecting sequence. See page 3-26.

Reviewing or Selecting Special Parameters

Selecting the ABP Monitor and Report Language. This specifies the language used in the ABP monitor's display and report. There are five languages available (and corresponding Operator Manuals, too):

English, **Italiano**, **Français**, **Deutsch**, and **Español**.

Press **No** or **Next** to continue to the next Special Parameter, or press **Yes** if you want to change the language from the one currently shown.

> **!** Once you select a language and press **Next**, the ABP monitor will display all messages in that language, so choose a language that is familiar to you.
>
> If you mistakenly enter a foreign language, keep pushing the green button until **Change Language ?** appears again.

Press **Up** or **Down** to review the other choices or change the selection.

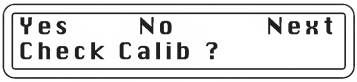
When the language you want is shown in the display, press **Next** to accept it and continue to the next parameter.

Selecting the Time Display Format. Time can be represented as a.m./p.m. time, or as 24-hour time.

The display will say **AM/PM Yes** if a.m./p.m. time is selected, or **AM/PM No** if 24-hour time is selected.

To change the display, press **No** for 24-hour time, or press **Yes** for a.m./p.m. time.

Press **Next** to accept the time display format as shown, then continue to the next parameter.



The Calibration Check Feature. The ABP monitor's pressure measurement accuracy and microphone sensitivity can be verified with this feature. This is explained in **Service, Supplies & Maintenance,** Section 8.

This is not one of the Special Parameters, so press **Next** to continue to the next parameter.

Selecting Auto Dump. Auto Dump initiates rapid cuff deflation at 20 mmHg below the Diastolic pressure. This is a comfort feature to the patient, because the arm gets quicker relief from the cuff pressure. Auto Dump is On in the default.

If the automatic dumping feature is Off, slow deflation continues until the cuff pressure is only 20 mmHg. The ability to turn off Auto Dump is useful in the special case of simultaneous, same-arm efficacy studies. In most cases, it is preferable to turn on the Auto Dump feature.

Press **On** if you need to turn Auto Dump On, or press **Off** if you want to turn it Off.

After making your selection, press **Next** to continue.

Selecting the One Day Maximum Feature. If One Day Maximum is On, the ABP monitor will discontinue taking measurements (automatic and patient-activated) when 24 hours have elapsed from the first measurement. The default is On.

If One Day Max is Off, the ABP monitor continues taking measurements until the batteries are low. If multi-day ABP monitoring is planned, then choose Off.

Press the **Off** or **On** button to choose On or Off.

Exiting the Special Parameters Menu. Press **Yes** if you have made the selections you wanted and are ready to return to the main menu or quit. Exiting from here continues the Power-On sequence of Self-Tests, and entry into the main menu.

OR

Press **No** or **Next** if you would like to review the Special Parameters again.

! If you are going to quit now, remove and dispose of the AAA batteries before storage. (Removing the batteries now prevents someone from attempting to begin the next ABP monitoring period with used batteries.)

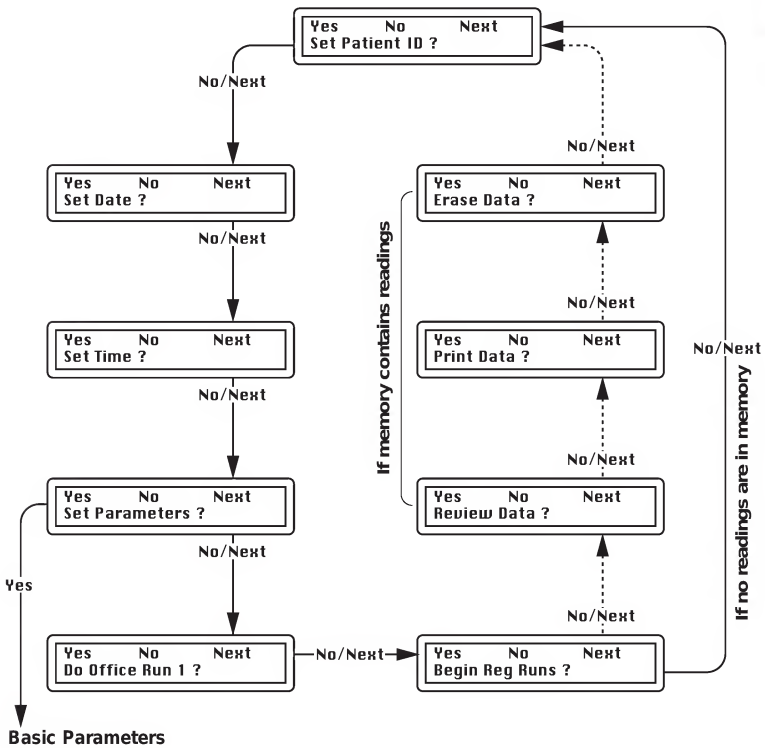
Flow Charts for Parameter Programming

Flow charts are diagrams that show the sequence of messages or questions that you follow while operating the ABP monitor.

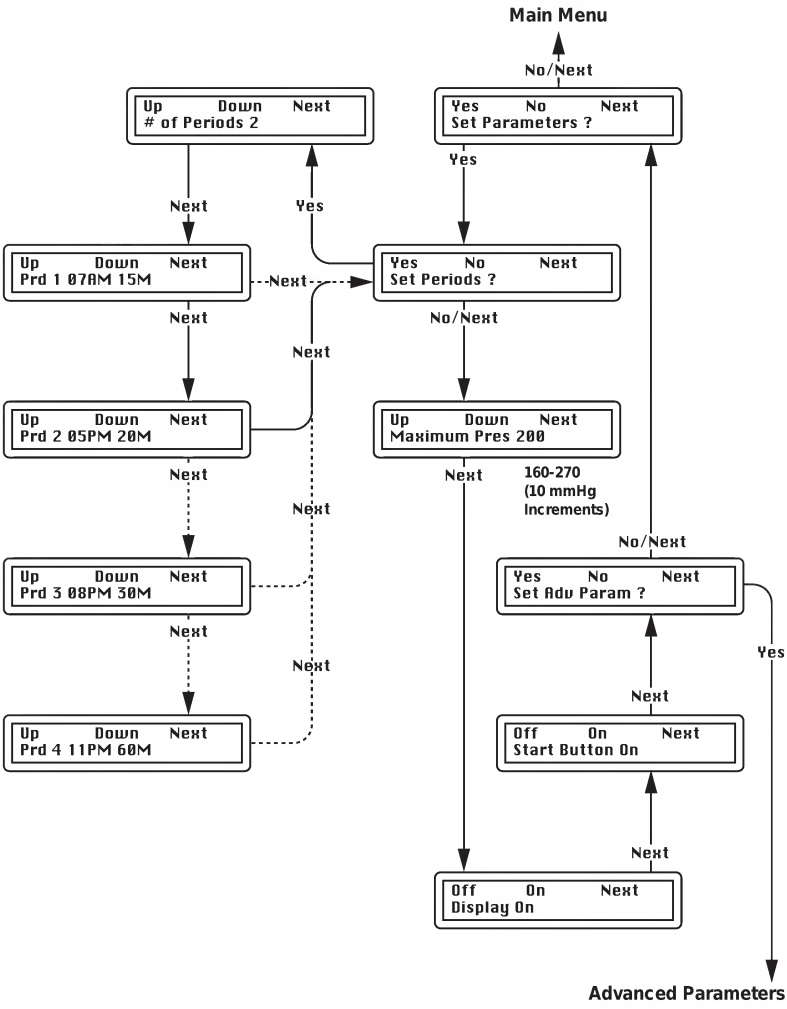
The flow charts can be used like road maps to illustrate the pathways of selecting and reviewing the parameters.

You may find it helpful to use the flow charts to accompany your progression through this section's written instruction. The flow charts can also be used as a shortcut to the instructions to help you reset a particular parameter at a later date.

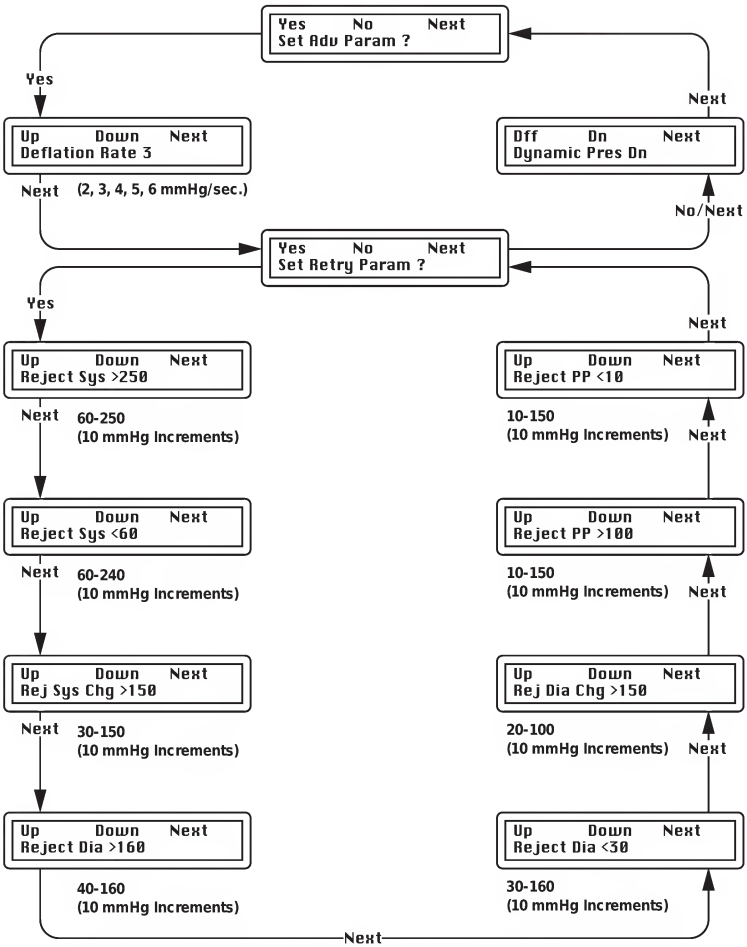
Main Menu Flow Chart



Basic Parameter Programming Flow Chart

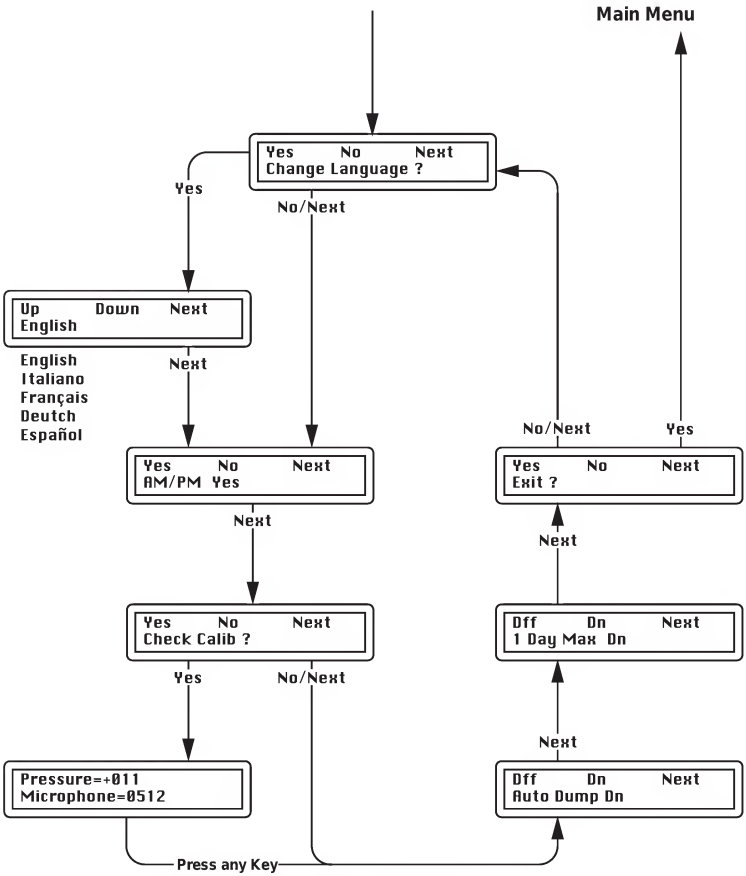


Advanced Parameter Programming Flow Chart



Special Parameter Programming Flow Chart

(To access, close battery door and hold down left button during Self-Test.)



Office Record of Program Selections

Keep a record of your program selections here. Note that the ABP monitor returns itself to the default settings whenever it is serviced or the internal battery is removed. Because of this, it is helpful to have this reference handy to remember your selections.

Basic Parameters

Parameters	Choices	Selection
Number of Periods	1, 2, 3, or 4. Default is 2.	
Beginning Time	Default is 7 a.m. for first period; 11 p.m. for second.	Period 1:
		Period 2:
		Period 3:
		Period 4:
Frequency	Manual, 5, 10, 15, 20, 30, 60, or 120 minutes. Default is 15 for first period; 30 for second period.	Period 1:
		Period 2:
		Period 3:
		Period 4:
Maximum Pressure	160-270 mmHg in increments of 10. Default is 200.	
Display	On or Off. Default is On.	
Patient Activation Button	On or Off. Default is On.	

Advanced Parameters

Parameters	Choices	Selection
Deflation Rate	Range is 2-6. Default is 3.	
Max Allowable Sys Pressure	60-250 mmHg in increments of 10. Default is 250.	
Min Allowable Sys Pressure	60-240 mmHg in increments of 10. Default is 60.	
Max Allowable Change in Sys Pressure	30-150 mmHg in increments of 10. Default is 150.	
Max Allowable Diastolic Pressure	40-160 mmHg in increments of 10. Default is 160.	
Min Allowable Diastolic Pressure	30-160 mmHg in increments of 10. Default is 30.	
Max Allowable Change in Dias Pressure	20-100 mmHg in increments of 10. Default is 100.	
Max Allowable Pulse Pressure	10-150 mmHg in increments of 10. Default is 150.	
Min Allowable Pulse Pressure	10-150 mmHg in increments of 10. Default is 10.	
Dynamic Pressure	On or Off. Default is On.	

Special Parameters

Parameters	Choices	Selection
ABP Monitor Language	English, Italiano, Français, Deutsch, and Español	
Time Display	a.m./p.m. time, or 24-hour time	
Auto Dump	On or Off. Default is On.	
One Day Maximum	On or Off. Default is On.	

Patient Hookup 4

This section will guide you step-by-step through the hookup procedure. The illustrations and explanations will help you learn the routine for the ABPM hookup procedure.

Page	Topic
4-2	Before the Patient Arrives
4-4	Preparing the ABP Monitor for Use
4-12	Sizing the Cuff to the Patient
4-14	Positioning the Cuff & Microphone
4-21	Taking the Office Runs
4-24	Verifying the Setup
4-26	Beginning the Regular Runs
4-27	Positioning the Pouch & Tubing
4-29	Instructing the Patient

✱ **NOTE:** If you are already familiar with the hookup and don't need the details provided in this section, refer to the **Quick Guide to Hookup**. This is on page iii, right before Section 1.

✱ **Note to First Time Users:** It is important to have a basic understanding of the ABP monitor before beginning a patient hookup. If you have not worked with the ABP monitor yet, you need to read and work through **Getting Started,** Section 2 before continuing in this section.

Also, if you want to customize the ABP monitoring procedure but are unfamiliar with selecting the ABP monitoring parameters, we suggest that you work through Basic Parameters, in Section 3, before beginning a patient hookup.

Before the Patient Arrives

When scheduling the procedure, inform the patient in general how ambulatory blood pressure ABP monitoring works, what to expect, and what to wear.

Advising the Patient What to Wear

Men — Suggest garments with loose-fitting sleeves or short sleeves. Men may prefer to wear an undershirt beneath a dress shirt.

Women — Long-sleeve sweaters or dresses should not be worn on the day of the hookup. Blouses with loose-fitting sleeves are suggested. Loose-fitting cardigan sweaters may also be worn.

Advising the Patient of Activity Restrictions

While the Tycos QuietTrak Ambulatory Blood Pressure Monitor is designed for ambulatory use, the patient should not plan to swim or bathe during the ABP monitoring period. Also, the vibrations from power tools or heavy equipment may disrupt the ABP monitoring attempts and should be avoided.

Carefully advise the patient to plan a day free of these activities.

Preparing the Items Needed for ABPM Hookup

Prior to the patient's arrival, gather the items needed for the hookup procedure.

Hookup Checklist:

- Tycos QuietTrak ABPM
- Cuff assemblies (have both Medium and Large sizes available, to ensure you can properly fit the patient), including an anchoring strap
- ABP monitor pouch and belt or shoulder strap
- Four new AAA batteries
- Hookup kit, including: Patient Diary, microphone anchoring pad, and cuff anchoring pad.

Write the patient's name, identification number, and today's date on the diary cover. The patient identification number can be entered into the ambulatory blood pressure monitor (up to eleven digits in length) and will be printed in the patient's report.

Suggestion: Record the patient's name and a unique identifying number in a log book. You'll have a record of where the ABPM is, and you'll be able to track usage.

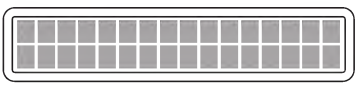
Preparing the ABP Monitor for Use

Begin by loading fresh batteries. Remove any used batteries from the ABP monitor. Keep the used batteries separate from your fresh battery supply so that you don't accidently re-insert them into the ABP monitor. (Dispose of the used batteries according to local regulation.)

Load four fresh AAA batteries and close the battery compartment door.

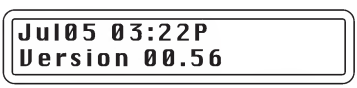
The Power-On Self-Test

Wait while the ABP monitor completes the Self-Test. Verify that the date and time shown during the test are correct.



LCD Test

Autozeroing



Date/Time/Version

Patient ID

BP Readings

Error Messages

If the ABP monitor's Self-Test fails, an error message appears. The **Troubleshooting Guide,** Section 7 explains each message and offers help.

One of Three Messages Appears Following the Self-Test:

The message that comes up following the Self-Test reflects what the ABP monitor was doing when it was last used.

Set Patient ID ? This message will appear if there are no patient readings currently stored in the unit's memory. In this case, you are clear to proceed with setting the Basic Parameters.

Review Data? This message will appear if data from a previous patient study remains in memory. The data will remain stored in the memory until it is intentionally erased. If you want to review or print the data now stored in memory, refer to Section 5 for instructions.

To proceed with clearing the data from memory and preparing for a new patient, press **Next** until you see the following:

Erase Data ? Choose **Yes**.

Are You Sure ? Choose **Yes**.

The display will change to **Set Patient ID ?** and you can proceed to Setting the Patient ID on the next page.

Resume Readings? This message will appear if a 24-hour ABP monitoring period has been interrupted. Most often this would occur if a patient removes the batteries, or opens and closes the battery door, during the 24-hour period.

This message will be displayed for one minute. If no commands are made, the unit will automatically resume the Regular Run cycles.

To prepare for a new patient study, you must review and/or print out the current data and then clear the memory. Refer to Section 5 for instructions on reviewing and printing data. To proceed with clearing the memory, press **No** or **Next** until you see the following:

Erase Data ? Choose **Yes**.

Are You Sure ? Choose **Yes**.

This will clear all data from memory and the display will change to **Set Patient ID ?** You can proceed to Setting the Patient ID, below.

Hint: If you accidentally pass **Set Patient ID ?**, continue pressing **No** or **Next** until the message appears again.

Setting the Patient ID

Set Patient ID ? At this display, you are ready to begin entering the patient's identification number. Press **Yes**.

A cursor will appear in the first character space. There is room to enter up to eleven digits or spaces.

To enter the first number of the patient's ID, press **Up** or **Down** until the number you want is shown. Press **Next** to accept the number and move to the next character space.

Enter the second number of the patient's ID using the **Up** or **Down** button in the same way.

To leave a blank space after a number, press **Next** while the cursor is highlighting a blank space.

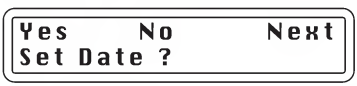
Continue selecting numbers and pressing **Next** until you have entered the entire ID number.

When all digits have been selected, press **Next** one or more times until the **Set Patient ID ?** message appears.

You've just set the patient ID, so press **Next** to proceed.

(Or, press **Yes** to review what you just did or re-set the patient ID.)

Setting the Date



The **Set Date ?** message appears next. If the date shown during the Self-Test sequence was correct, then you don't need to set the date. Press **Next** to omit setting the date and go to Setting the Time on the next page.

Or, press **Yes** if you want to check or set the date, and continue from here.

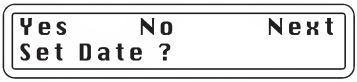
The new display shows today's date, and a cursor highlights the month.

If the month is correct, press **Next** to move the cursor to the next field.

OR

If the month is incorrect, press **Up** or **Down** to rotate through the calendar and select the correct month. When the correct month is showing, move the cursor to the next field by pressing **Next**.

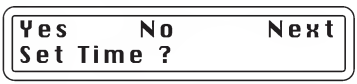
After setting the month, set the day and then the year. When all fields are set, press **Next** to return to the **Set Date ?** display.



You've just set the date, so press **Next** to proceed.

(Or, press **Yes** if you want to review what you just did or re-set the date.)

Setting the Time



Setting the time works like setting the date. If the time shown during the Self-Test sequence was correct, then press **Next** to omit setting the time and proceed to Setting the Parameters.

Or, press **Yes** to set the time, and continue from here.

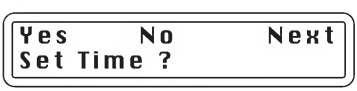
The display shows the current time, and a cursor highlights the hour.

If the hour shown is correct, press **Next** to move the cursor to the minutes.

OR

If the hour is incorrect, press **Up** or **Down** to move to a later or earlier hour. When the hour is correct, press **Next** to move the cursor to the minutes.

After setting the hour, set the minutes. Press **Next**.



You've just set the time, so press **Next** to continue.

(Or, press **Yes** if you want to set the time again, or review what you just did.)

* To change from a.m./p.m. to 24-hour clock, refer to Special Parameters in Section 3, page 3-18.

Setting the Parameters

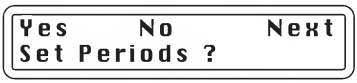
Set Parameters ? When this display appears, you may review the current parameter settings and either accept or change them.

If you would like to accept the current parameter settings, press **Next** and refer to Sizing the Cuff to the Patient, page 4-12.

Or, to review or change the parameters, respond with **Yes**. The **Set Periods ?** message will appear.

An abbreviated guide to setting the parameters is provided here. If you are not familiar with the ABP monitoring parameters and need more information, review Basic Parameters in Section 3.

The Set Periods Parameter



Set Periods ? This allows you to select the number of ABP monitoring periods (**1**, **2**, **3**, or **4**), define when those periods begin, and select the frequency of the automatic blood pressure measurements taken during each period.

To omit setting the periods and go on to the next Basic Parameter, Press **No** or **Next** and proceed to Setting the Maximum Pressure,

OR

Press **Yes** to review or define each period.

Selecting the Number of Periods. This allows you to select the number of ABP monitoring periods (**1**, **2**, **3**, or **4**).

Press **Up** or **Down** to change the number shown on the ABP monitor's display. When the number of periods you want is displayed, press **Next** to accept the number.

Set the beginning time of the first period next.

Setting the Beginning Time of the Period. A cursor highlights the beginning time for the first period, **Prd 1**.

Select the period's beginning time by pressing **Up** or **Down** to move to a later or earlier time.

Press **Next** when the correct beginning time is shown. The cursor will move to highlight the next field, the frequency setting.

Next, set the measurement frequency for this period.

Measurement frequency is the time interval, in minutes, between automatic readings. The choices are **Man**ual, **5**, **10**, **15**, **20**, **30**, **60**, or **120** minutes.

Select the frequency of measurements with the **Up** or **Down** button until the one you want appears.

After selecting the measurement frequency, or if you want to accept the frequency currently shown, press **Next**.

The next period that needs to be defined will be displayed.

Define the next period by following the same steps you used with the first period.

Repeat the same steps to define the third and fourth periods, if needed.

Setting the Maximum Pressure. This determines the maximum cuff inflation pressure.

To change the pressure, press the **Up** or **Down** buttons and scroll through the pressures until the desired one appears.

Press **Next** to accept the selected pressure.

Turning the Display On or Off. This turns the ABP monitor's display of blood pressure readings On so they are visible to the patient, or Off so the patient does not see them.

Press **On** or **Off** according to your display preference. Then, press **Next**.

Turning the Patient Activation Button On or Off. If On, the patient can initiate a blood pressure measurement by pressing a button. If Off, the patient cannot initiate a blood pressure measurement; only the programmed readings are taken.

Press **On** or **Off** according to your preference. Then, press **Next**.

When you have completed reviewing or selecting the Basic Parameters, you can continue with the Advanced Parameters, or you can proceed with preparing for the Office Runs. Press **Next** to ready the ABP monitor for Office Runs. Set the ABP monitor aside and move on to Sizing the Cuff to the Patient.

* The Advanced Parameters are explained in Section 3. Here, we will assume you are accepting the Advanced Parameter settings as they are, since they generally are not changed from one patient hookup to the next.

Sizing the Cuff to the Patient

When preparing to put the cuff on the patient, seat the patient comfortably in a private room. If the patient has long sleeves, have him or her remove the shirt so the upper arms are accessible for the hookup.

Determine Which Arm to Take the Readings From

In most cases, you can simply ask the patient whether he/she is right-handed or left-handed, and select the non-dominant arm for the hookup. The best arm for cuff placement is the one used less frequently, so the arm can be relaxed and motion-free during the measurements.

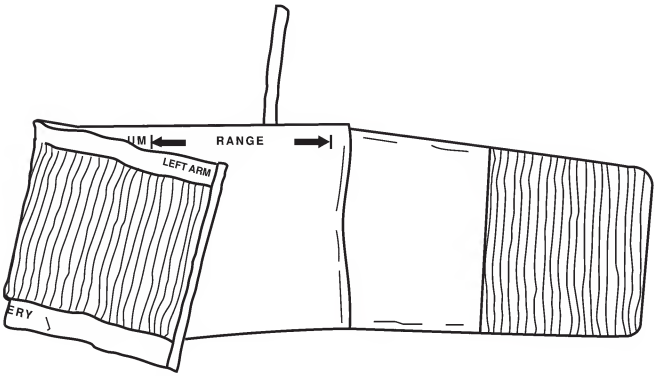
After identifying the arm that will be used, you need to fit the cuff. Medium and Large cuffs will fit most adult arms, and are included with the ABP monitor. A small size is available as an option from your Welch Allyn/Tycos Distributor.

The Importance of Correct Cuff Size

There are two simple methods for determining the right size cuff for the patient. Use either method.

! Careful sizing of the cuff is important to the accuracy of the blood pressure readings. If the cuff is too small, the readings could be falsely high.

Determining Cuff Size with the Cuff Markings



One way to ensure proper cuff size is to wrap the cuff around the patient's upper arm and visually check it. The cuff is marked with two divisions that indicate **"range"**. When the cuff is properly fit, the cuff edge will meet the cuff at some point within the range.

Chart for Determining Cuff Size

You can also determine cuff size by measuring the patient's arm circumference midway between the elbow and shoulder, and then use the chart below to select the correct cuff.

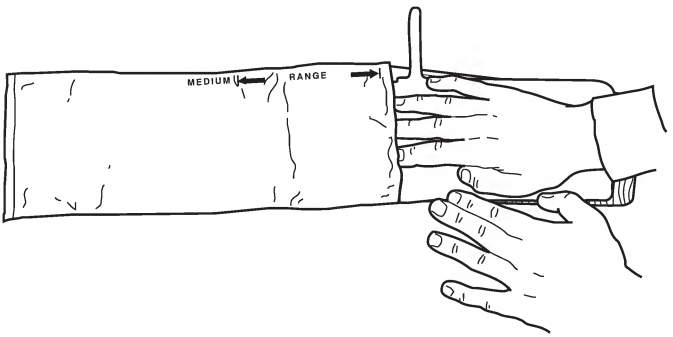
Cuff Size	Arm Circumference
Small	12 to 21 cm
Medium	18 to 32 cm
Large	21 to 39 cm

Positioning the Cuff & Microphone

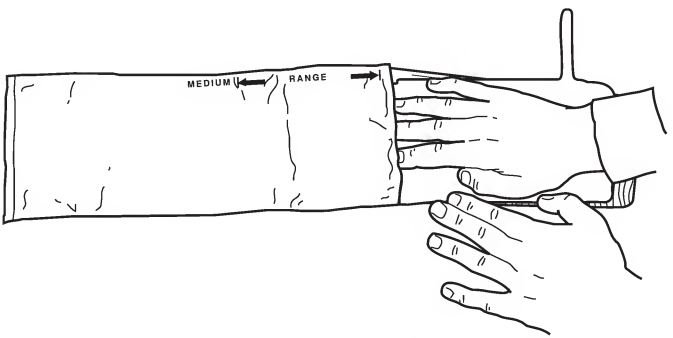
Obtain a cuff assembly and pneumatic assembly in the proper size for the patient. The cuff assembly is made up of the cuff and bladder. The pneumatic assembly is made up of the air hose and the microphone assembly. If the cuff and pneumatic assembly have been taken apart for cuff washing or to change cuff sizes, you will need to reassemble them. Please follow these steps:

Inserting the Bladder into the Cuff

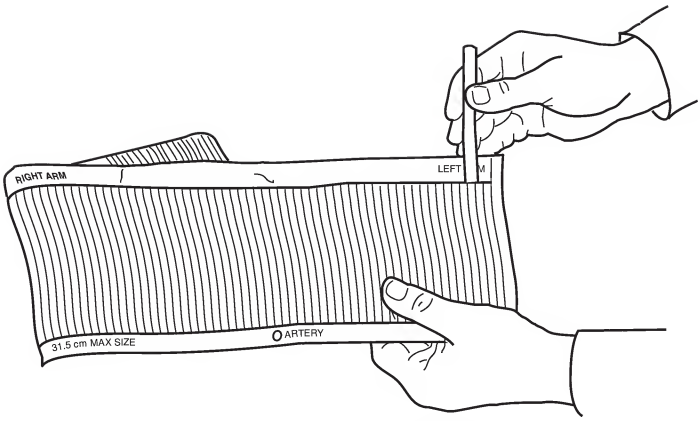
Slide the bladder into the cuff, making sure the bladder lies flat and unfolded.



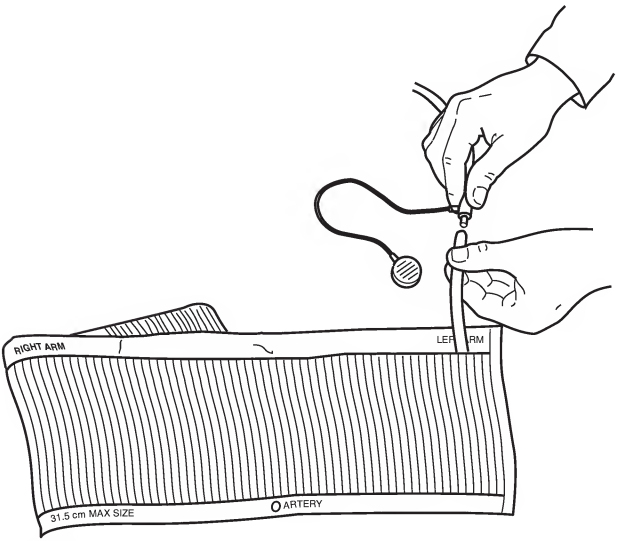
This illustration shows the bladder insertion for **Left-Arm** placement.



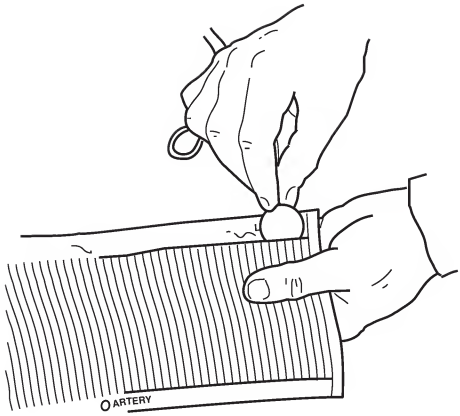
If the cuff will be worn on the **Right Arm**, the bladder orientation is reversed.



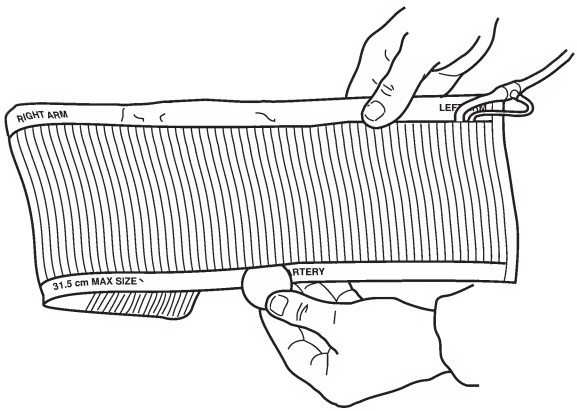
Pull the bladder's tubing through the small opening (marked **Left Arm** for **Left-Arm** placement) near the edge of the cuff. Note that there are two openings. One is for **Right-Arm** cuff placement, and one is for **Left**. (They are labeled on the face of the cuff.)



Attach the tubing from the bladder to the pneumatic assembly.

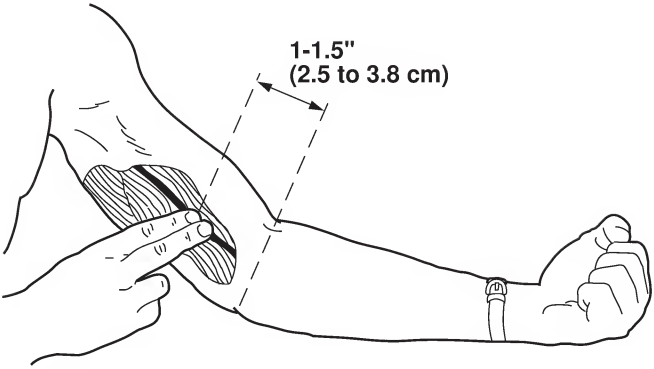


Next, thread the microphone back through the same small opening with the bladder tube.



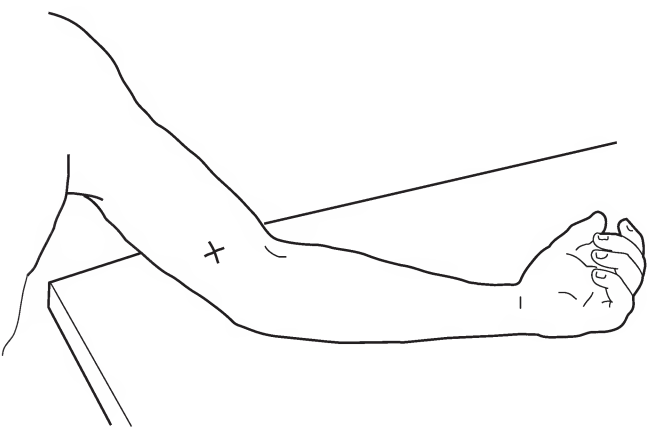
Push the microphone through the cuff and out through the small opening labeled **Artery** as shown. Make sure the microphone cable was threaded on top of the bladder, not on the side that will be next to the arm.

Locate the Brachial Artery



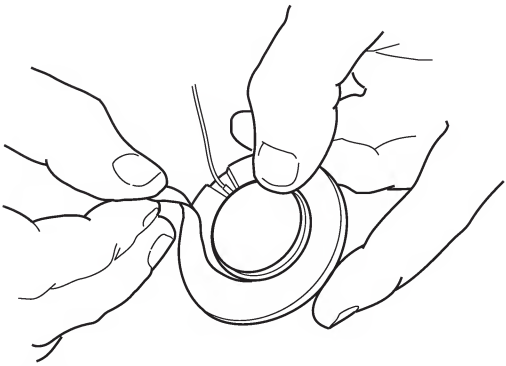
Have the patient flex the arm and locate the area between the bicep and tricep, 1 to 1.5 inches (2.5 to 3.8 cm) above the elbow on the inside of the patient's arm. With your index and middle fingers, press into the area and feel for the pulse of the brachial artery. To confirm that you have located the artery, palpate the wrist at the same time; the pulses should beat at the same rate.

Mark the Location of the Artery

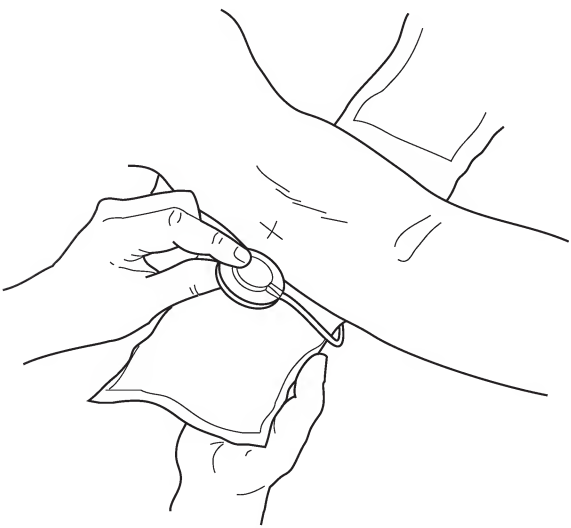


Boldly mark the location of the brachial artery with a felt pen to identify the site for microphone placement.

Use of the Microphone Anchoring Pad



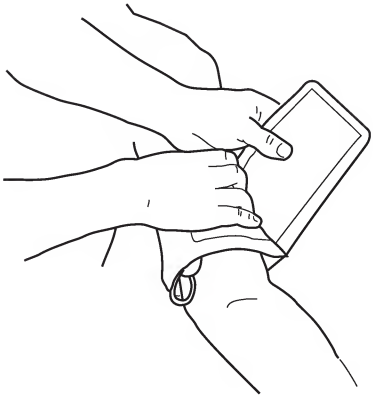
Find the adhesive microphone anchoring pad in the hookup kit. **Peel the backing off the pad** and insert the microphone with the label side facing microphone pad and away from arm. Position the microphone cable through the slit in the pad.



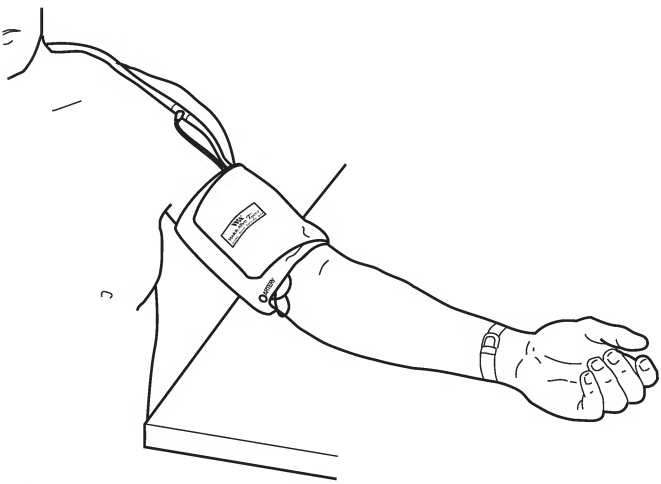
Attach the microphone anchoring pad with microphone to the brachial artery location. Firmly seal the adhesive to the arm.

! Incorrect microphone placement or orientation, or incorrect cuff placement, can cause inaccurate measurements.

Wrapping the Cuff

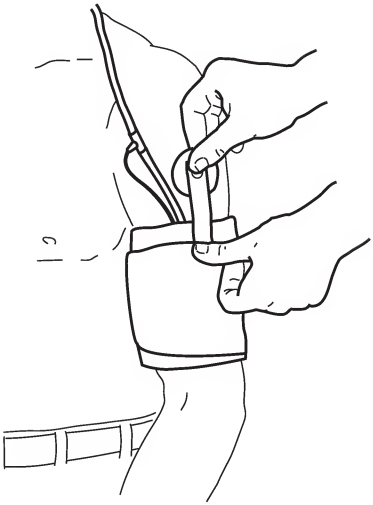


Center the circle on the cuff marked **Artery** over the microphone. A slight bit of white microphone pad should be showing under the edge of the cuff. Wrap the cuff snugly around the patient's arm. Check that the cuff is not so tight that it impedes circulation or arm movement.

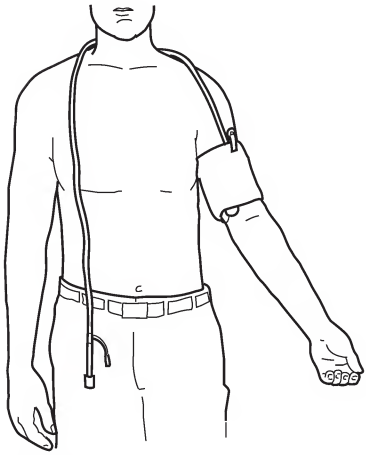


Make sure the tubing comes out of the opening at the top of cuff and follows up towards the shoulder.

Secure the Cuff

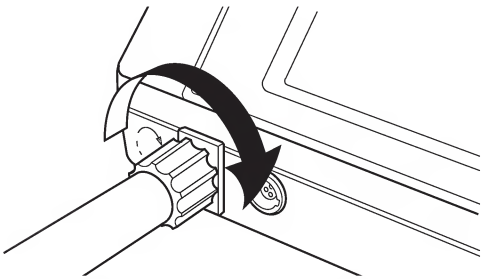


The cuff should be secured to prevent slippage during the ABP monitoring period. Locate the cuff anchoring pad from the hookup kit and snap it onto a cuff anchor strap. Attach the fabric fastener to the top of the cuff near the shoulder. Peel off the backing of the pad and apply the anchoring pad to the patient's arm, leaving a small amount of slack.



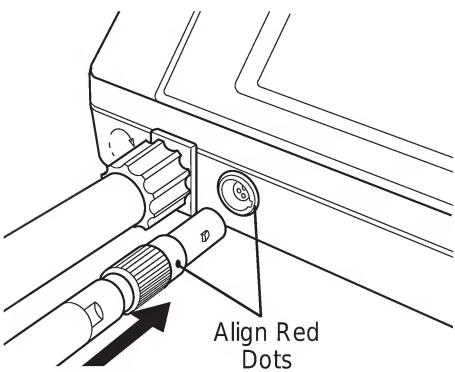
Lead the tubing up the arm and over the shoulder. Drape the tubing loosely around the patient's neck to the front of the body or to either side.

Connecting the ABP Monitor to the Patient's Cuff Assembly



Attach the cuff assembly's connector to the port on the front of the ABP monitor with a backwards (counterclockwise) twist (about a quarter turn), and then twist it clockwise until it is snugly attached to the ABP monitor. With this method, the connector should be securely locked in place.

! **Do not overtighten the connector; only moderate tightening is required.**



To attach the microphone cable, align the red dot on the microphone cable connector with the red dot on the ABP monitor's microphone port, and then insert the microphone. You should hear or feel a slight "click" as the microphone locks in place.

Check that the arm cuff and tubing are still positioned properly on the patient. Hold the ABP monitor or carefully place it on a nearby table.

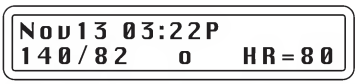
Taking the Office Runs

Office Runs are important for several reasons. Besides being a good test of the ABP monitor's function and the patient hookup, the Office Runs help prepare the patient for what to expect during the ABP monitoring period. And importantly, during the Office Runs, the ABP monitor's microphone adjusts its gain level, adapting to the patient's own Korotkoff sounds.

For these reasons, we recommend that you complete **at least three Office Runs** during every patient hookup.

Before beginning an Office Run, ask the patient to relax the arm and to remain as motionless as possible. When the patient is ready, press **Yes**.

Next, press **Start** to initiate the run.

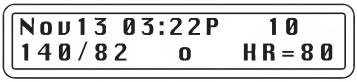


The first Office Run will always inflate to the preset maximum pressure. Subsequent Office Runs will inflate 30 mmHg above the previous Systolic reading, if Dynamic Pressure is turned on.

When the run is complete, the date, time, blood pressure measurement, and heart rate will be displayed for two minutes. Then another Office Run can be taken. To move to **Do Office Run 2 ?** before two minutes are up, press the green button.

The small **o** between the blood pressure reading and the heart rate (**HR**) indicates that the measurement was an Office Run. Symbols that appear here are called Initiation Codes.

If there were any difficulties, now is a good time to adjust the cuff, check all tubing connections, and recheck the microphone positioning before taking the next run.



About Error Codes: A two-digit Error Code may appear in the upper right corner of the display if a problem was encountered during the measurement. For an explanation of Error Codes, review the measurement Error Codes in the **Troubleshooting Guide,** Section 7.

! During Office Runs, it is normal to encounter Error Codes. The unit is becoming adjusted to the Korotkoff sounds of the individual. It may be necessary to take three or more Office Runs to eliminate the Error Codes.

When you are ready to take another Office Run, press **Yes**, then press **Start** to initiate the second run.

You can repeat as many Office Runs as needed to help the patient understand the procedure and practice relaxing for the measurement.

***** If the ABP monitor's display is turned On in the Basic Parameters, show the patient how the readings will appear in the display.

When you have completed three or more Office Runs successfully, you can proceed to the next section, Verifying the Setup, or to Beginning the Regular Runs by pressing **Next**.

Verifying the Setup

Once you have successfully completed three Office Runs, you may wish to take a simultaneous blood pressure reading to verify that the Tycos QuietTrak ABPM is set up and operating correctly.

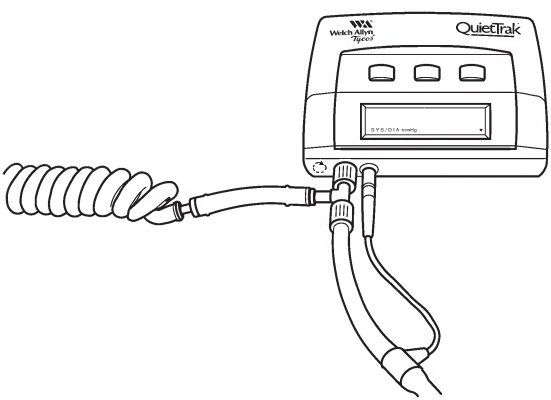
! You should not attempt to do a simultaneous reading until at least three Office Runs have been completed and no Error Codes are present.

Items Needed for Simultaneous Measurement:

- **Accurate** office sphygmomanometer
- Calibration T-connector
- Tubing adaptor
- ABP monitor and cuff assembly

Instructions for Setup

Disconnect the Tycos QuietTrak cuff and microphone assembly from the ABP monitor. Assemble the T-connector to the ABP monitor's cuff hose (Leur) connector. Connect the QuietTrak cuff and microphone assembly to the T-connector. Attach one end of the tubing adaptor to the T-connector, and the other to a properly-calibrated office manometer. Refer to setup shown below.



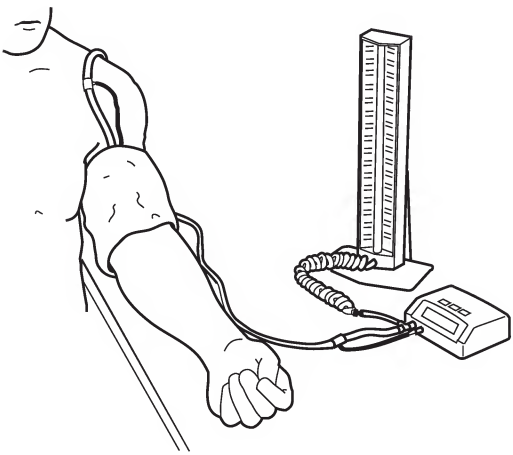
A well-trained observer will now use a stethoscope to measure the patient's blood pressure simultaneously with the QuietTrak ABP Monitor.

Yes	No	Next
Do Office Run 4 ?		

Proceed by answering **Yes** to the next Office Run.

Exit	Exit	Start

Press **Start** to initiate the run.



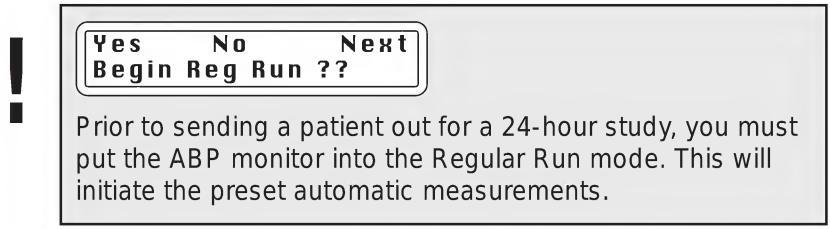
Allow the ABP monitor time to complete its measurement cycle before concluding the reading or moving the patient.

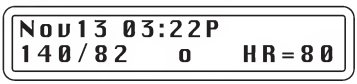
Important

Expect to see minor variations between the reading given by the QuietTrak and the observer's measurement. Just as no two people would determine the exact same measurement, this discrepancy is unavoidable and normal. Variation between the ABP monitor and the observer of ±5 mmHg or less is considered acceptable. If encountering problems, call your local Welch Allyn/Tycos Service Center for assistance.

When you have completed Setup Verification, remove the T-connector and reconnect the cuff to the ABP monitor. You can now proceed to Beginning the Regular Runs by pressing **Next**.

Beginning the Regular Runs


Yes No Next
Begin Reg Run ??
Prior to sending a patient out for a 24-hour study, you must put the ABP monitor into the Regular Run mode. This will initiate the preset automatic measurements.



If an Office Run measurement is still displayed, press the green button to get back to the menu.

Press **Next**.

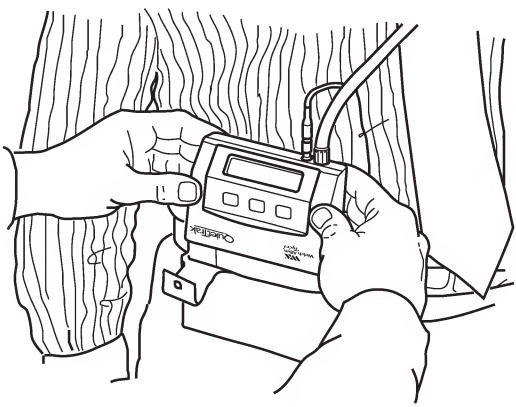
To begin the Regular Runs of the ABP monitoring process, press **Yes**. The first measurement will be taken after the specified interval for the current time period has elapsed. Times are adjusted to the hour.

Positioning the Pouch & Tubing

Shoulder Strap or Belt? Ask the patient for any preference towards a shoulder strap or belt. A person who is mostly going to be seated may find the strap is most comfortable, because the ABP monitor can rest in the lap. A person who will be up and down frequently may find the belt more comfortable. If preferred, the patient's own belt can be used, as long as it is narrow enough to slip through the pouch's loops.

If using the strap, clip the strap's fasteners to the rings on the pouch. If using a belt, slide the belt through the loop on the back of the pouch. Help the patient put on the shoulder strap or the belt.

Inserting the ABP monitor into the Pouch

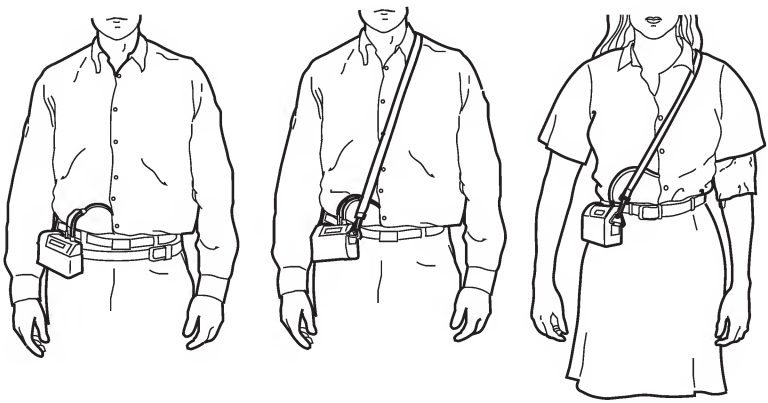


Insert the ABP monitor into the pouch as shown, making sure the display is fully visible and the green Patient Activation Button is positioned directly under the open cutout locator. Close the pouch.

Deciding Where to Place the ABP monitor

The pouch should be placed where it is comfortable for the patient, and where it won't restrict movement. Assist the patient with any needed adjustments, making sure the patient can easily reach the Patient Activation Button as needed.

The straps and tubing can be concealed inside the patient's clothing, or can be positioned on the outside. Decide with the patient which would be preferable. Have the patient replace his or her shirt if it was removed earlier, and check that the tubing is secured but does not restrict the patient's movement. Below are suggestions.

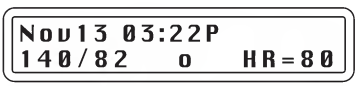


Instructing the Patient

Reposition the ABP monitor if necessary so the patient can activate readings, cancel readings and view the display.

Viewing the Display

Show the patient where the display is, and that the date and time will appear continuously.



Optional: If the display is turned On in the Basic Parameters, then point out where the blood pressure readings will appear following each measurement.

Explaining the Diary

Give the patient the diary and explain how to fill it out with time of day, symptoms/mood and activity/position. Give some examples of what you mean by:

- **Symptoms** (such as chest pain, tenseness, feeling fine)
- **Activities** (washing dishes, sitting to read, lying down, watching TV)

Demonstrating the Patient Activation Button

If the Patient Activation Button is turned On in the Basic Parameters, explain how to initiate readings by pressing and releasing the button when a symptom appears. Show the patient where the button is and ask the patient to press it now to take a reading.

! Advise the patient to **PRESS** and **RELEASE** the button; **DO NOT** hold the button down. Holding the button down can turn the ABP monitor off. See Instructions to Patient on page 4-30 for more details.

Cancelling the Readings

The Patient Activation Button is able to cancel readings when necessary, too. This is a safety feature that is available even if the Patient Activation Button is turned Off in the Basic Parameters.

Explain to the patient that he or she can press and release the Patient Activation Button while a reading is in progress to cancel the reading. For example, a reading can be cancelled if the patient gets in the middle of a task and cannot momentarily pause for the reading.

Positioning the ABP monitor at Bedtime

Explain how to detach the ABP monitor and remove the strap or belt to change clothing at bedtime. Suggest that the patient sit on the bed and carefully place the ABP monitor beside him while changing so that it doesn't drop to the floor. For sleeping, have the patient position the ABP monitor alongside the body or near the head of the bed. It might be more comfortable and quiet if a pillow is placed over the ABP monitor; this also helps prevent the patient from rolling on it.

Instructions to the Patient

To Deactivate the ABP monitor: If the patient must remove the ABP monitor and cuff prior to returning to the clinical site, he/she can PRESS and HOLD the Patient Activation Button for SIX SECONDS. The ABP monitor will cease taking readings and can be removed from the patient's arm. The ABP monitor stores the data for retrieval later; no data is lost.

PRESS and HOLD the green Patient Activation Button for THREE SECONDS and the **Hold Button to Quit** message will appear.

Continue holding the button for THREE MORE SECONDS, and the message **Off** will appear. The unit will cease taking any measurements.

Upon releasing the button, the message **Press Button to Resume** will stay on indefinitely as a reminder to the patient.

To restart the regular cycle, the patient can press the green button and the message **Auto Readings will Resume** will appear. This message will stay on for two minutes. Readings will resume per the current period interval.

! It is inadvisable to allow the patient to deactivate and remove the cuff and microphone assembly unless no more readings are required. Once the adhesive microphone anchoring pad is removed, the patient will have difficulty in correctly repositioning the microphone over the brachial artery.

Scheduling the Patient's Return

Remind the patient of the day and time to return with the ABP monitor and the diary. If the patient cannot return at the time coinciding with the end of the ABP monitoring session, explain how to turn the ABP monitor Off by pressing and holding the Patient Activation button for at least six seconds. Then the ABP monitor can be removed from the patient and safely set aside until the scheduled return date.

Summary of Patient Do's and Don'ts

Do's

- Record time, symptom/mood, and activity/position in diary.
- Press Patient Activation Button to take a reading when any symptoms are felt.
- Keep arm as motionless as possible during measurement.
- Keep travel time in car or other vehicle to a minimum.
- Return on the specified date and time, and bring the diary with you.

Don'ts

- Don't remove the cuff and microphone from original location.
- Don't get the ABP monitor wet.
- Don't attempt to operate a power tool or heavy equipment during a reading.

Advising the patient to keep his or her arm motionless during the measurement is crucial to attaining accurate and reliable readings. If the QuietTrak ABP Monitor detects significant noise, motion or Korotkoff sounds at the end of inflation, the ABP monitor will **re-inflate** the cuff and start the measurement over. Re-inflations will continue until no Korotkoff sounds or noises are detected, or until maximum inflation pressure is reached.

Advise the patient to be careful while operating a vehicle. While the ABP monitor is taking a measurement, the patient's ability to operate a vehicle may be impaired due to restriction in arm motion.

When the Patient Returns 5

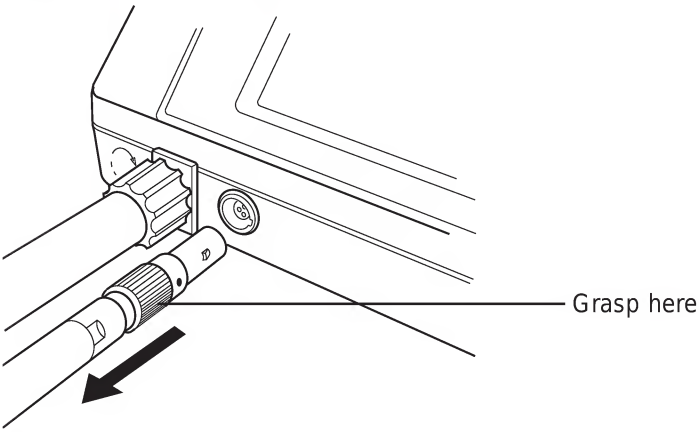
This section instructs the operator how to disconnect the patient and retrieve the Tycos QuietTrak ABPM report.

Page	Topic
5-2	Disconnecting the ABP Monitor
5-3	Ending the ABP Monitoring Session
5-5	Reviewing the Data
5-7	Printing the Data

Disconnecting the ABP Monitor

When the patient returns at the end of the ABP monitoring session, remove the ABP monitor from its pouch, disconnect the microphone cable and cuff tubing, and set the ABP monitor aside for a moment. Remove the anchoring pads and the arm cuff, then assist the patient in removing the belt or shoulder strap.

Disconnecting the microphone cable from the ABP Monitor:



To remove microphone connector, place your index finger and thumb on the knurled portion of the connector and pull straight back (away from the monitor). **Do not twist!**

Review the Diary With the Patient

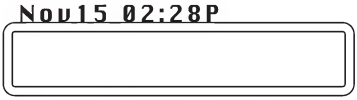
Ask for the diary and review it together in case the patient now remembers something that was omitted. Add any missing details and clarify any words you don't understand. The patient is now finished and can go home.

Ending the ABP Monitoring Session

When the patient returns the ABP monitor, one of the following three messages will be displayed. The message that is displayed will reflect the status of the unit:

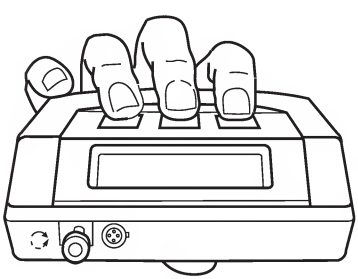
1 Day Max Limit will be displayed if the unit is returned after 24 hours since the first Regular Run reading was taken, and the unit has not been turned off or the batteries removed.

* **Note:** To program the ABP monitor to go beyond the 24-hour maximum, refer to Section 3, **Choosing Program Options.**



If the 24-hour time limit has not elapsed and the Regular Runs are still in progress, the time and date will appear as normal.

If either of the above two messages are displayed, you will need to **end the ABP monitoring session** by pressing all three buttons simultaneously. The display will change, and you will be presented with the **Review Data ?** screen. You have effectively ended the ABP monitoring session.



The third possible message, **Resume Readings ?** will appear if the patient removes the batteries prior to returning to the clinical site, and before the programmed ABP monitoring period had elapsed. This message will appear when batteries are inserted and the unit completes the Self-Test.

Respond with **No**, and the **Review Data ?** message will appear.

* In rare circumstances, the messages **Battery Failure** or **300 RDG Limit** may appear. Refer to Section 7, page 7-7 for an explanation. Press all three buttons to return to the main menu.

When the question **Review Data ?** appears, respond with **Yes** if you would like to review the data on the ABP monitor's display, or press **Next** and proceed to Printing the Data if you prefer to print the report now.

Reviewing the Data

At the conclusion of the ABP monitoring session, the data can be reviewed in three ways:

- You can review all or part of the data on the ABP monitor's display

  OR

- You can generate a multi-page report and data summary on the optional Epson printer

  OR

- You can review and print data through your IBM compatible PC using the QuietTrak ABPM software.

The first two options will be explained below. The third option is explained in the manual included with the QuietTrak software package.

Reviewing the Data on the ABP Monitor's Display

Press **Yes** to begin reviewing the data on the ABP monitor's display.

With the commands **Next** and **Back**, you can move backwards or forwards through the data, one measurement at a time.

Or, you can stop reviewing the data at any time by pressing **Exit** (the green button).

Press **Next** to review the data, beginning with the start of the data.

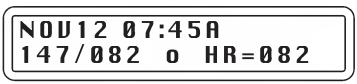
Total Number of Readings: The display will present the total number of blood pressure measurements taken.

From this point on while reviewing data, the directional messages at the top of the display, (**Next, Back, Exit)** will not be displayed. You must remember that the left button functions as **Next**, the middle as **Back**, and the right as **Exit.**

Press **Next** (the left button) to continue.

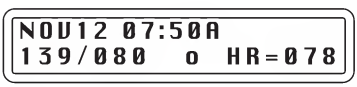
Patient ID: The next display will provide the patient identification number.

Press **Next** (the left button) to continue.



The first BP reading. The first measurement taken is shown in the display. The bottom line provides the Systolic and Diastolic measurements, the initiation code (if applicable), and heart rate.

To proceed to the next reading, press the left button, **Next**.



The next BP reading. The display advances to the next measurement each time the left button, **Next**, is pressed. If you want to back up to a previous reading, press the middle button, **Back**.

Continue reviewing the data with the left and middle buttons. Pressing the left button, **Next**, at the "End of Data" screen will return the display to the "Start of Data" screen.

To stop reviewing the data at any time, press the green button to **Exit**.

Press **No** to stop reviewing the data on the ABP monitor's display.

After you have reviewed the data, you can print the data on the optional Epson printer that is available with your Tycos QuietTrak Ambulatory Blood Pressure Monitor.

Printing the Data

Before pressing **Yes**, connect the ABP monitor to the printer and prepare the printer.

The printer specified for the QuietTrak ABP Monitor is the Epson LX810/LX800, which has been equipped with a serial port to receive the ABP monitor's data. The instructions and illustrations that follow apply only to this printer.

*

The QuietTrak ABP monitor is also compatible with many other Epson compatible printers equipped with the following serial interface specifications:

- 9600 Baud
- 8 data bits
- no parity checking
- Serial interface valid
- X-on/X-off handshaking

The Printer should be set for a page length of at least 11 inches, character set USA graphics, short tear-off valid, cut sheet feeder mode off, skip-over perforation off, and auto line feed off.

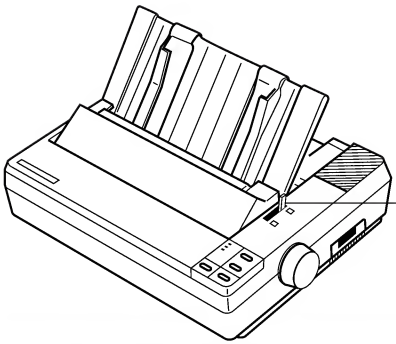
Call your local authorized Welch Allyn/Tycos Service Center for information on additional printer options not available at the time of this publication.

Printer Setup

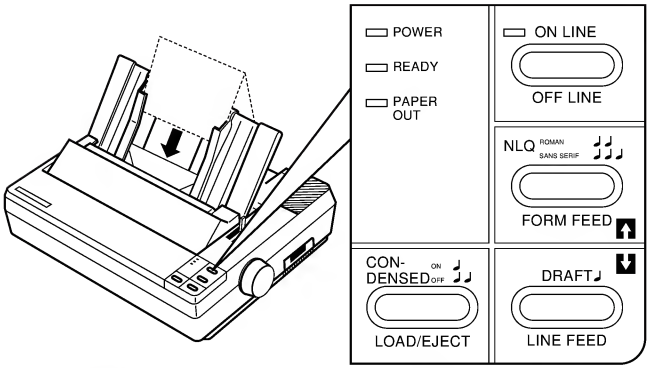
If you are unfamiliar with operating the printer and need additional information, refer to the Epson printer operation manual included in the printer box.

Turn the power on. The printer's power switch is located on the left side of the printer.

Load the paper. Single sheet or continuous (tractor feed) paper can be used for printing the ABPM report. If you are unfamiliar with how to load the paper, refer to the printer's operation manual for additional help.



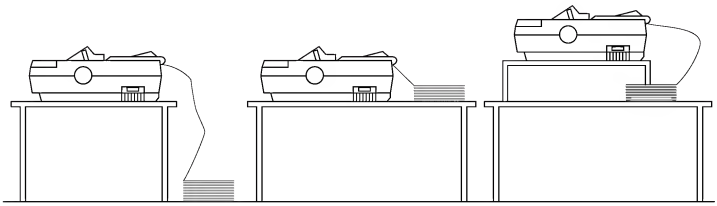
* Verify that the paper release lever is in the back position for single sheet, and the forward position for continuous feed paper.



The ABPM report can be printed in Draft or Near Letter Quality modes. The printer's condensed function is overridden by the ABP Monitor. Refer to the Epson manual for more information.

Positioning your Continuous Paper Supply

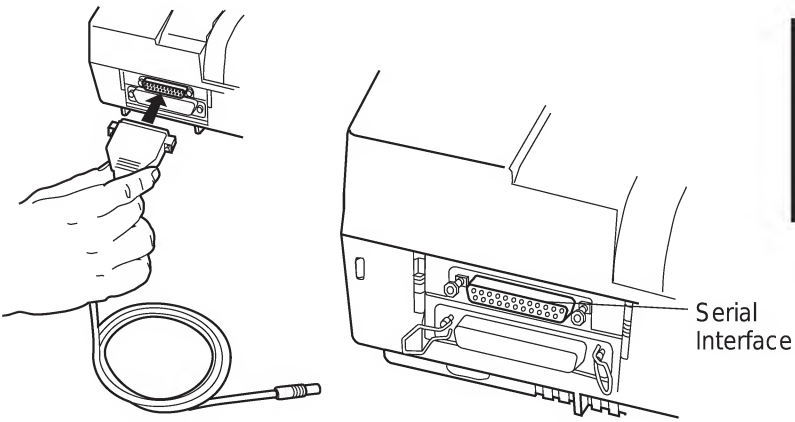
Here are three ways to position your printer and supply of continuous paper:



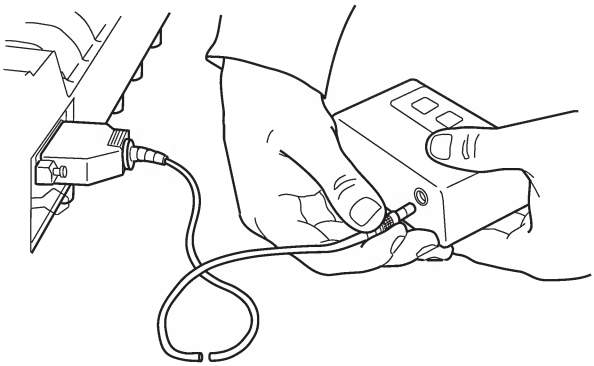
Make sure you align your paper supply with the paper loaded in the tractor, so that the paper feeds smoothly into the printer.

Connecting the ABPM Printer Cable to the Printer

Turn off the printer. Connect the ABPM printer cable to the serial interface on the back of the Epson printer. Tighten the two screws on the connector for secure fit.



Connect the printer cable to the ABP monitor by first aligning the red dots, and then firmly inserting the connector into place. To undo the connector, grasp the knurled sleeve and pull it straight out.



! Make sure to remove cuff and ABP monitor from patient prior to printing. Unit will not take readings when printer cable is attached.

Put the printer On-Line. Check that the On-Line indicator on the printer's front panel is lit. If not, press the On-Line button.

Yes	No	Next
Print Data ?		

When the printer is ready, press **Yes** to begin printing the Ambulatory Blood Pressure Report.

Stop	Stop	Stop
Sending Data		

Wait while the ABP monitor sends the data and generates the report.

Pressing **Stop** will halt the transmission of data which has not reached the printer.

After printing data, disconnect the printer cable from the ABP monitor. For specific information concerning the ABPM report, refer to Section 1, pages 1-6 to 1-12.

Clinical Recommendations 6

This section discusses important considerations regarding the clinical applications of ambulatory blood pressure monitoring, and offers guidance in selecting the best candidates for the procedure.

Page	Topic
6-2	The Clinical Usefulness of Ambulatory Blood Pressure Monitoring
6-5	Application of ABPM to Your Practice
6-6	Patient Benefits of ABPM

The Clinical Usefulness of Ambulatory Blood Pressure Monitoring

What is Ambulatory Blood Pressure Monitoring? ABPM is a technique used to provide whole-day monitoring of a patient's blood pressure. With the Tycos QuietTrak ABPM, a small, inconspicuous ABP monitor is worn by the patient, automatically recording blood pressure data at frequent intervals. The ambulatory measurements reveal the patient's blood pressure fluctuations during normal activities, around the clock.

Why Consider ABPM?

Using office blood pressures, traditional criteria have established that a Systolic value over 140 mmHg or a Diastolic value over 90 mmHg is diagnostic for hypertension. But, infrequent blood pressure measurements taken in the clinical setting may not be truly representative of the patient's average daily blood pressure.

Current clinical evidence suggests that perhaps as many as 25% of patients diagnosed as hypertensive and undergoing antihypertensive treatment may not be hypertensive.[1,2,3] The Tycos QuietTrak ABPM system provides accurate, reliable patient data, so the physician can have more confidence in the diagnosis.

ABPM — The Bigger Picture

The results from ABPM reflect a more comprehensive picture of the patient's blood pressure than blood pressures taken in the physician's office.

The bigger picture is important in patients with transient symptoms that possibly relate to blood pressure changes, because these symptoms may not occur when the doctor is examining the patient.

ABPM is also useful in identifying "white coat" phenomenon, where the patient's blood pressure has a tendency to increase when measured in a medical environment. The around-the-clock readings may demonstrate that the patient is actually normotensive, and prevent inappropriate therapy for the patient.

Thus, ABPM can help resolve the sometimes perplexing disparity between clinic and home pressures, because the ABP monitor goes home with the patient as an unbiased, reliable observer. The physician does not have to worry about the patient's blood pressure monitoring skills.

Clinical Indications for ABPM

ABPM is a useful tool for clinicians and may be a practical method to assess a number of common indications. These are listed in Table 1.

Table 1.

Clinical Problems in Which Noninvasive Ambulatory Blood Pressure Monitoring is Useful.

- Evaluation of newly-diagnosed hypertensives without target organ damage
- Disparity between clinic and home pressures
- Resistant hypertension
- Intermittent symptoms possibly related to blood pressure changes
- Episodic hypertension
- Orthostatic hypotension/autonomic neuropathy
- Evaluation of treatment

Source: National High Blood Pressure Education Program Working Group Report on Ambulatory Blood Pressure Monitoring, Archives of Internal Medicine, 1990, 150: 2270-2280.

Cost Considerations of ABPM

Hypertension therapy is invaluable to the patient's well-being as it successfully prevents strokes, heart disease, and renal insufficiency. But the monetary cost of the treatment may be tremendous when lifelong totals of office visits, medications, laboratory tests, and lost time from work are considered.

If a portion of borderline or "white coat" hypertensives could be identified as normotensives through the use of ABPM, and antihypertensive treatment can be avoided, then great savings are realized. There are also the savings to the patient that we cannot put a price on, such as assurance of well-being, and the avoidance of side-effects related to antihypertensive therapy.

Additionally, the improved blood pressure control in complex hypertensives, as assessed by ABPM, may have long-term cost effectiveness.

Who is a Candidate for ABPM?

Candidates for ABPM need careful selection based on clinical indications (Table 1); screening everyone has not been recommended.

Among the good candidates are patients who demonstrate consistently high office blood pressure readings, but do not exhibit target organ damage such as:

- Heart changes seen on ECG,
- Renal dysfunction,
- Lipid abnormalities,
- Evidence of diabetes or glucose intolerance,
- Other physical indications such as changes in the optic fundi,

and do **not** have risk factors such as smoking or family history of hypertension or heart disease. The ABPM procedure can help identify the patients who truly need treatment, and allow other patients to avoid treatment that isn't necessary.

Application of ABPM to Your Practice

Traditionally, Systolic pressure values over 140 mmHg or Diastolic pressure values over 90 mmHg are considered diagnostic for hypertension.

The corresponding values for whole-day ABP monitoring are slightly lower, at 135/85 mmHg, because blood pressure values tend to peak during the daytime hours and then fall during sleep; the lower measurements taken while the patient sleeps affect the overall blood pressure average.[4]

What is Normal in ABPM?

Current clinical evidence redefines mild hypertension levels. Based on 24-hour ABP monitoring, mild hypertension exists when at least 40% of the awake readings are above 140/90 mmHg, and at least 40% of the sleep readings are above 120/80 mmHg.[5]

The presentation below is a study of 126 normotensive adult white men and women, and may be a useful guide for comparison with your ABPM studies (Table 2).

Table 2

Ambulatory Blood Pressures (ABP) and Blood Pressure (BP) Load in Normal Subjects

AGE		20-29	30-39	40-49	50-59	60-69	70-79
(number of patients)		(22)	(22)	(18)	(25)	(23)	(16)
SYSTOLIC mmHg	24-hour	122±9	121±8	120±10	124±12	127±12	133±16
	Awake	125±10	125±9	124±11	127±12	130±12	137±17
DIASTOLIC mmHg	24-hour	67±7	71±5	73±7	75±7	75±4	69±9
	Awake	70±8	74±5	75±8	77±7	77±5	71±9
BP LOAD*	Systolic	9±14	8±11	8±10	13±16	18±19	25±20
	Diastolic	3±7	4±6	6±8	6±7	6±7	4±7

mean ± standard deviation

*BP load is % reading Systolic > 140 mmHg and Diastolic > 90 mmHg while awake and standard deviation

Source: Zachariah PK, Sheps SG, Bailey KR, et al. Ambulatory Blood Pressures and Blood Pressure Load in Normal Subjects, Am J Hypertens 1989; 2:50.

Patient Benefits of ABPM

By providing a complete picture of the patient's blood pressure, ABPM helps the physician to determine the need for hypertension therapy in difficult-to-diagnose cases with improved accuracy. To the patient, it is an opportunity to avoid unneeded medication and misclassification as a hypertensive.

When the physician has confidence in the diagnosis and can openly discuss the ABPM results with the patient, the patient can personally see the need for treatment. The patient's involvement in the test may improve his or her understanding of blood pressure, and can pave the way to improved communication and cooperation with the physician.

Improved patient compliance can lead to improved control of hypertension, and that is the ultimate goal of ABPM.

Footnotes

[1] Krakoff LR, et al. "Effect of Ambulatory Blood Pressure Monitoring on the Diagnosis and Cost of Treatment for Mild Hypertension." Am Heart J 1988; 116:1152-1154.

[2] Weber MA. "Automated Blood Pressure Monitoring: A New Dimension in Diagnosis." Mayo Clin Proc 1988; 63:1151-1153.

[3] Weber MA. "Evaluating the Diagnosis and Prognosis of Hypertension by Automated Blood Pressure Monitoring: Outline of a Symposium." Am Heart J 1988; 116:1118-1123.

[4] White WB and Morganroth J. "Usefulness of Ambulatory Monitoring of Blood Pressure in Assessing Antihypertensive Therapy." Am J Cardiol 1989; 63:94-98.

[5] White WB, Dey HM, Schulman T, "Assessment of the Average Daily Blood Pressure Load as a Determinant of Cardiac Function with Mild to Moderate Hypertensives." Am Heart J 1989; 118:782-795

Troubleshooting Guide 7

This section provides help in troubleshooting potential difficulties which might arise while using the Tycos QuietTrak Ambulatory Blood Pressure Monitor.

Page	Topic
7-3	Error Messages (in alphabetical order)
7-5	Error Codes
7-7	Special Messages
7-8	Trouble Chart

Troubleshooting Guide

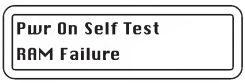
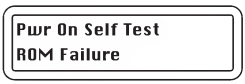
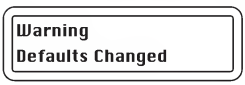
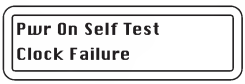
The Troubleshooting Guide is a checklist of problems and solutions to assist you in case the Tycos QuietTrak ABPM fails to operate properly.

The Problem Chart provides recommendations for a variety of problems. The Error Messages and Error Codes explain the ABP monitor's self-diagnostic messages and what you should do if they appear. The Special Messages section explains messages which, under special circumstances, may appear during Regular Run sessions.

If you follow the recommended procedures and the ABP monitor still fails, return it to a Welch Allyn/Tycos Service Center for repair.

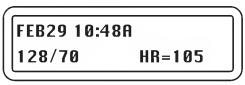
Error Messages (in alphabetical order)

Message	Response to Problem
Autozeroing Failed	The ABP monitor was unable to reset itself to a zero pressure reading. Was the patient flexing and moving the arm during Autozeroing? If so, open and close the battery door to restart Autozeroing, and this time have the patient be still. Residual pressure in the cuff may cause Autozeroing failure. This temporary Autozeroing problem can be remedied by allowing the cuff to fully deflate before opening and closing the battery door to restart Autozeroing. If the Autozeroing message repeats after numerous run attempts, then there may be a problem in the pressure sensing circuit. Return the ABP monitor to a Welch Allyn/Tycos Service Center for repair.
Pwr On Self Test Battery Failure	The battery voltage is too low to attempt an ABP monitoring procedure or print the patient data. Replacing the batteries should clear this problem. If new batteries do not resolve the problem, there may be a problem in the battery circuitry; return the ABP monitor to a Welch Allyn/Tycos Service Center.
Pwr On Self Test Battery Warning	This message is displayed for one minute and then the ABP monitor proceeds with normal operation. Press any button to clear the message sooner. During the warning, the batteries are not sufficient to attempt a patient hookup, but there is enough power left to print the patient data, set the parameters, or set the date and time. Before beginning a patient hookup, however, replace the batteries with fresh ones. Fresh batteries are recommended to provide the power needed to complete the recording period.

Message	Response to Problem
	The internal memory chip used by the program has failed. Return the ABP monitor to a Welch Allyn/Tycos Service Center for repair of the RAM.
	The program memory chip has failed. Return the ABP monitor to a Welch Allyn/Tycos Service Center for repair of the ROM.
	This appears following the Power-On Self-Test if the internal lithium battery has expired. The unit will still operate with this warning condition, but removal of AAA batteries could result in loss of all data. To replace the lithium battery, return the ABP monitor to a Welch Allyn/Tycos Service Center.
	The default parameter settings have been changed to the factory settings. Recycle power. If message reappears, return the ABP monitor to a Welch Allyn/Tycos Service Center.
	The internal clock has failed. Return the ABP monitor to a Welch Allyn/Tycos Service Center for repair.

Measurement Cycle Codes

A two-digit code appears in the upper right corner of the display after each measurement cycle. No code indicates that the measurement was completed successfully; the other codes indicate that the reading failed, and provide a reason for the failure.

	Cycle was successfully completed. No problem was found.

The ABP report lists all failed readings and annotates each with one of the error codes. Here are the error codes, the explanations, and possible solutions.

In many cases, the error will clear itself up with the next measurement.

Error Codes

01 **Cycle was stopped** by pressing the Patient Activation Button. The automatic readings will resume at the next specified measurement interval, or the Patient Activation Button can be pressed again to initiate a reading.

02 **Major air leak.** Check tubing, connectors. Check bladder. Replace any damaged accessories and try again.

03 **Power failure.** Replace batteries with fresh ones and retry.

04 **Autozeroing failure.**

- Could be caused by patient flexing arm during Autozeroing; initiate the next run and this time have the patient be still.
- Could be caused if a second run was demanded before the previous run was completed; if so, wait for cuff to fully deflate before initiating the next run.
- Could be a problem with the ABP monitor's sensing circuit. If the problem doesn't clear up with the next reading, call a Welch Allyn/Tycos Service Center.

05 **Reached target pressure too quickly.** Hose may be pinched. Check hose and retry.

06 **Over pressure.** Patient may have flexed arm during reading, or some type of pressure disturbance occurred. Try again.

07 **Over 10 mm for 180 seconds.** Cuff is not properly deflating. Check cuff and tubing for possible reason. Call a Welch Allyn/Tycos Service Center.

08 **Too much artifact or excessive arm movement.** Check microphone placement and adhesive for possible dislocation. Retry a measurement when there are no loud noises or vibrations to cause a problem. If it doesn't clear up, replace microphone or call a Welch Allyn/Tycos Service Center.

09 **No Korotkoff sounds found.** Check microphone placement and insure correct side is facing patient's arm. Retry. The patient may have very low Korotkoff sounds. If it doesn't clear up on other patients, replace microphone or call a Welch Allyn/Tycos Service Center.

10 **Korotkoff sounds too weak.** Check microphone placement and insure correct side is facing patient arm. The patient may have very low Korotkoff sounds. Retry several measurements to allow microphone to adjust. If code persists, check and reposition microphone placement. If it doesn't clear up on other patients, replace microphone or call a Welch Allyn/ Tycos Service Center.

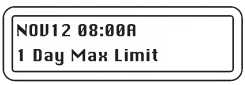
11 **Korotkoff sounds too strong.** The patient may have very loud Korotkoff sounds. Retry several measurements to allow microphone to adjust. If code persists, call a Welch Allyn/ Tycos Service Center.

12 **Korotkoff sounds out of system range.** Probably caused by arm motion or noise artifact. Try another cycle.

13 **Systolic too close to target pressure.** ABP monitor determined Systolic pressure too close to targeted inflation level to permit reliable measurement.

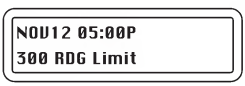
Special Messages

The following messages may appear during a patient ABP monitoring session if certain measurement limits are reached.

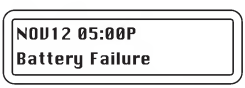


This message will appear if a reading is attempted after the programmed 24-hour period has elapsed. No readings will be allowed.

To disable the 24-hour limit, refer to Section 3, **Choosing Program Options.**

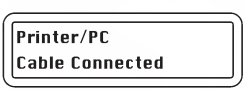


This message will only appear if more than 300 measurements have been attempted in a patient session. 300 readings is the maximum which the ABP monitor can store.



This message will appear if a measurement is attempted and the battery power level has dropped below the acceptable limit.

New batteries can be inserted at this time to allow the session to continue.



This message will appear if a reading is attempted while the printer or PC cable is attached. Remove cable and try again.

Trouble Chart

Trouble	Response to Trouble
Cycle starts, but cuff won't fully inflate.	Ensure connection with ABP monitor is secure and check bladder for leak; replace if needed.
	Replace batteries and try again.
Unit does not dump pressure when Diastolic pressure is determined.	Check that Auto Dump setting is ON in the Special Paramenters menu.
Blood pressure readings are not displayed during Regular Runs.	Check that the display setting is ON in the Basic Parmeters menu.
Patient activation button does not initiate readings while in the Regular Run mode.	Check that Start button is ON in the Basic Parameters menu.
Timed Regular Runs do not initiate.	Check that unit has been programmed into the Regular Run mode.
	Make sure that time period is not set for MAN (manual) operation.
Patient returns with one of the special messages displayed.	Refer to Special Messages section of Troubleshooting Guide for explaination, then proceed to "Ending the ABP Monitoring Session" of Chapter 5.
Blood pressure readings are failing with error codes being displayed.	Refer to explaination of codes in Measurement Cycle Codes section of Troubleshooting Guide for possible corrective action.

Trouble Chart

Trouble	Response to Trouble
Printer won't print data.	Check power cord for firm connection.
	Check printer cable to ensure firm connections.
	Ensure that printer is On-Line.
	Check that paper is loaded properly, not jammed.
	Install fresh batteries in ABP monitor and try again.
	Ensure proper printer communications setup, per Tycos QuietTrak ABPM specifications.
	Check Power light on printer. If not lit, then check that the power cord is connected to a functioning AC outlet and that the power switch is on.
	Check On-Line light on printer. If not lit, then press the On-Line button. If still not lit, then check that paper is loaded properly.
	Check printer communications setup (DIP switches).
	Check printer cable connections at each end.
	Open and close the battery door to reset the ABPM unit.
Review Data, Print Data, Erase Data messages do not appear.	These messages appear only if the ABPM unit contains data.

Trouble Chart

Trouble	Response to Trouble
Printing runs off top or bottom of page.	Reload paper using printer's automatic paper loading system.
Printing runs off side of page.	Reposition paper in printer.
Printing is slow.	Set printer to Draft mode by pressing the Line Feed button when printer is On-Line.
Print quality is poor.	Set printer to NLQ Roman mode by repeatedly pressing the Form Feed button when printer is On-Line until two beeps are heard.
	Replace ribbon if worn.
	See printer manual for other possible reasons.
Display messages are not understandable.	Check language setting in Special Parameters.

Service, Supplies & Maintenance 8

This section provides routine maintenance advice to keep your Tycos QuietTrak ABPM in peak operating condition.

Page	Topic
8-2	Calibration Check
8-6	Maintenance & Cleaning
8-7	Warranty
8-8	Welch Allyn/Tycos Service Centers
8-9	Ordering Supplies & Accessories

Calibration Check

The accuracy of the Tycos QuietTrak Ambulatory Blood Pressure Monitor's pressure measurements can be verified with an **accurate** office mercurial or aneroid sphygmomanometer. During this procedure, the microphone can be checked for sensitivity.

The calibration check is a simple yet valuable test to determine that the unit is sensing pressure and sound correctly.

!

It is suggested that a calibration check be performed after every ten ABP monitoring procedures. If questionable or unexpected blood pressure readings occur, a calibration check is recommended.

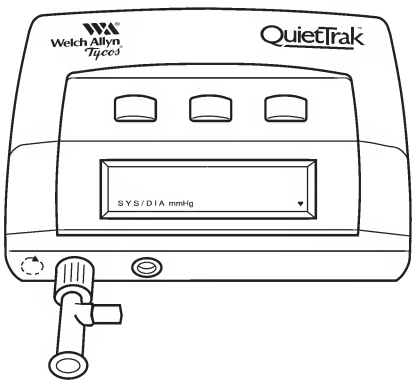
Be sure that the office sphygmomanometer you use is accurately calibrated.

Items Needed for Calibration Check

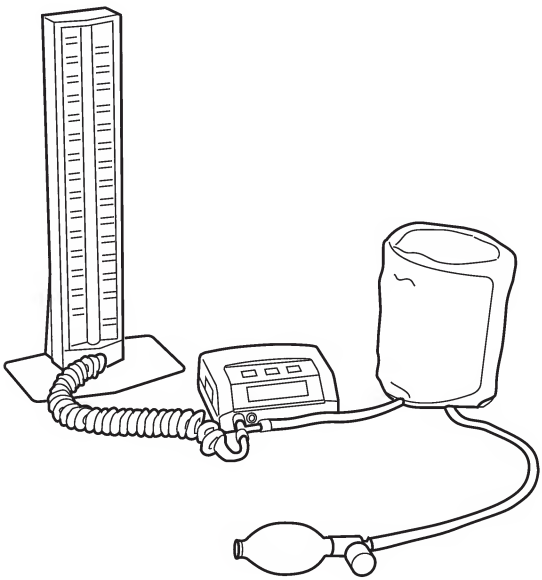
- **Accurate** office sphygmomanometer with inflation system
- Calibration T-connector
- One-pound coffee can (or any other rigid cylinder that approximates arm size)

Instructions for Setup

Disconnect the Tycos QuietTrak ABPM cuff and microphone assembly from the ABP monitor. Attach the Calibration T to the ABP monitor's cuff hose (Luer) connector.



Connect the male taper connector extending from the tubing of the office sphygmomanometer into the large, open end of the T-connector. Then connect the female taper connector extending from the office sphygmomanometer cuff to the other side of the T-connector. Wrap the arm cuff around the can. Check that all connections are tight.



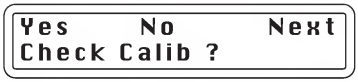
Initiate the ABP Monitor's Power-On Self-Test.

Open and close the battery compartment door to initiate the ABP monitor's Self-Test.

Enter the Special Parameters Menu.

During the Self-Test when the message for Date/Time/Version appears, press and hold the left button until the display changes. The first message in the Special Parameters Menu will appear on the display.

The first message in the Secondary Menu is for language selection. Press the **Next** button twice to advance to the **Check Calib ?** display.



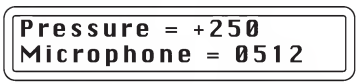
At the **Check Calib ?** display, the ABP monitor is ready to begin measuring pressure. Press **Yes** to begin.

To Check Pressure Reading Accuracy

Inflate the Cuff

Inflate the cuff manually to a pressure of about 250 mmHg by squeezing the manometer bulb. (If the cuff won't inflate, ensure that the valve on the bulb is fully closed and try again.) Now, slowly deflate the cuff and stop at 30 mmHg increments to compare the pressure reading on the manometer with the pressure reading displayed on the ABP monitor.

Expected Calibration Results



The ABP monitor displays the pressure in mmHg units, and this should compare closely with the manometer reading, within 3 mmHg, or 2% of manometer reading (whichever is greater).

Compare several readings taken at pressures of about 250-50 mmHg. This checks the ABP monitor within the range of typical blood pressure readings.

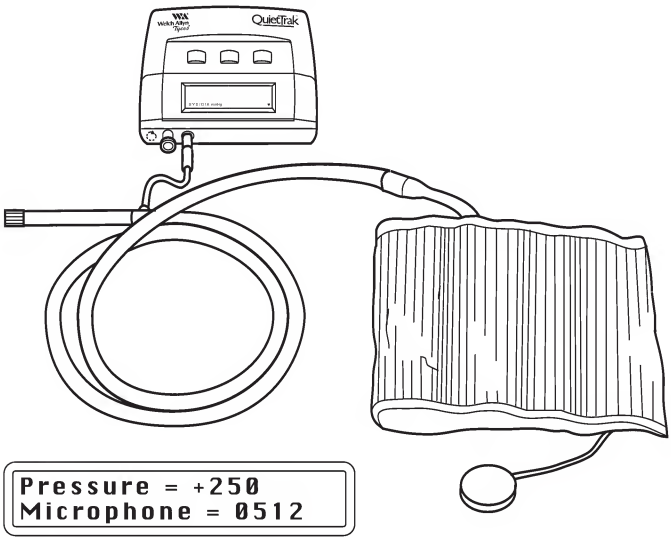
If the ABP monitor is not calibrated closely with the manometer, that is, within ±3 mmHg or 2% of reading (whichever is greater), return the ABP monitor to the nearest Welch Allyn/Tycos Service Center for repair.

! This calibration check vitally depends on the accuracy of the office reference gauge.

Checking the Microphone

During the calibration check, you can also check the sensitivity of the microphone. The microphone reading is displayed below the pressure reading.

To check the function of the microphone, disconnect the office sphygmomanometer, inflation system, and T-connector setup from the previous calibration check. Attach the microphone cable from the Tycos QuietTrak ABPM cuff and microphone assembly to the microphone port on the ABP monitor. It is not necessary to connect the air hose from the QuietTrak cuff for this test.



The microphone reading is measured and displayed in arbitrary units. At rest, the reading will be between 480 and 540 units, depending on the room noise level. Tap the microphone lightly with your fingertip to begin the sensitivity test.

If the microphone is working properly, the displayed microphone reading will jump to higher and lower numbers as you tap the microphone. If the microphone reading does not respond, check the microphone connection on the ABP monitor and try again. If it still does not respond, contact Welch Allyn/Tycos Service Personnel for possible replacement of the microphone.

Maintenance & Cleaning

Tips for cleaning the cuff, tubing, and ABP monitor are provided in the table below. Routine cleaning of the cuff between patients is recommended.

Item	Cleaning Agent	Method
ABP Monitor	Mild soap and water	Wipe with a soft cloth slightly dampened with a mild soap.
Cuff	Ethylene oxide (for sterilization)	Use standard hospital ETO sterilization procedures, followed by aeration.
	Laundry detergent (for general cleaning)	**Remove bladder and microphone.** Close Velcro. Wash cuff with regular laundry; gentle cycle. Dry flat, or machine dry on low heat.
	Mild soap and water (for spot cleaning)	Gently scrub soiled or stained areas with cloth soaked in mild soap solution.
Pouch	Mild soap and water	Wipe exterior surface with cloth soaked in mild soap solution.
Strap or Belt	Same as for Cuff	Same as for Cuff
Bladder	Alcohol	Wipe with alcohol. Let dry.
Tubing	Alcohol	Wipe with alcohol. Let dry.

Microphone Cleaning Instructions

As a result of normal use, adhesive residues may form on the sides of the microphone. These may be cleaned with a soft cotton cloth and a small amount of isopropyl alcohol. When removing the adhesive, hold the microphone on the sides and do not press or apply pressure to the arm side of the microphone.

! Do not launder the microphone or submerge it in any solutions. Remove the microphone before cleaning the cuff.

Warranty

The Welch Allyn/Tycos Warranty — ABP Monitor

Welch Allyn/Tycos warrants the Tycos QuietTrak Ambulatory Blood Pressure Monitor, when new, to be free of defects in material and workmanship and to perform in accordance with manufacturer's specifications for a period of two years from the date of purchase from Tycos or its authorized distributors or agents. Tycos will either repair or replace any components found to be defective or at variance from manufacturer's specifications within this time at no cost to the customer. It shall be the purchaser's responsibility to return the instrument directly to Tycos or to an authorized distributor, agent, or service representative. This warranty does not include breakage or failure due to tampering, misuse, neglect, accidents, modification, or shipping. This warranty is also void if the instrument is not used in accordance with manufacturer's recommendations or if repaired by other than Tycos or an authorized agent. Purchase date determines warranty requirements. No other express warranty is given.

The Welch Allyn/Tycos Warranty — Accessories

Welch Allyn/Tycos supplies and accessories are warranted against manufacturers defects for a period of two years from the date of purchase.

Return the Instrument Registration Card

Remember to submit the instrument registration card for warranty validation. Complete the information and mail the preaddressed card to your Welch Allyn/Tycos Service Center.

Repair

! Repairs must be done by authorized Welch Allyn/Tycos personnel. Failure to do so will invalidate the warranty.

Welch Allyn/Tycos Service Centers

If you have an equipment problem that you can't resolve with the **Troubleshooting Guide,** call the Welch Allyn/Tycos Service Center nearest you for assistance. Technical service support is available to you by telephone on normal business days, from 8:30 a.m. until 4:30 p.m. Eastern Standard Time at the phone numbers listed below.

If you are advised to return a product to Tycos for repair or routine maintenance, schedule the repair with the service center nearest you. Outside of the United States or Canada, return your Tycos QuietTrak Ambulatory Blood Pressure Monitor to your local authorized Welch Allyn/Tycos distributor.

! When returning an ABP monitor for repair, always include a complete description of the problem, along with your name, address, and phone number, in case there are any questions.

Welch Allyn/Tycos Service Centers — for Service or Repair

USA Customers
Tycos, Inc.
Technical Service Center
95 Old Shoals Road
Arden, NC 28704
U.S.A.
Tel.: (704) 684-4895
Fax.: (704) 687-1002

Canada Customers
Welch Allyn Canada Limited
Technical Service Center
160 Matheson Blvd. East
Mississauga, Ont. L4Z 1V4
Canada
Tel.: (416) 890-0004 or 1-800-561-8797
Fax.: (416) 890-0008

International Customers
Contact your local authorized Welch Allyn/Tycos distributor.

Latin America Customers
Call M.D. International
Tel.: (305) 669-9003 or
Fax.: (305) 669-8951 for the service center nearest you.

Ordering Supplies & Accessories

Supplies and accessories are available through your authorized Welch Allyn/Tycos dealer. Call the Welch Allyn/Tycos Customer Service Center nearest you for assistance in placing an order.

Welch Allyn/Tycos Customer Service Centers — for Information or Supplies

USA
Tycos, Inc.
Customer Service Center
95 Old Shoals Road
Arden, NC 28704
U.S.A.
Tel.: (704) 684-4895

Canada
Welch Allyn Canada Limited
Customer Service Center
160 Matheson Blvd. East
Mississauga, Ont. L4Z 1V4
Canada
Tel.: (416) 890-0004 or 1-800-561-8797

International Customers
Contact your local authorized Welch Allyn/Tycos distributor.

Latin America (Only)
c/o M.D. International
7324 S.W. 48th Street
Miami, FL 33155

Tycos QuietTrak Ambulatory Blood Pressure Monitor Supplies List

Part Order #	Description	Package Quantity
5100-41E (English)	Patient Hookup Kit; includes Patient Diary, microphone anchoring pad, cuff anchoring pad.	25 Kits per Pkg
5100-41F (French)		
5100-41G (German)		
5100-41I (Italian)		
5100-41S (Spanish)		
5100-42E (English)	Patient Diary	50 Diaries per Box
5100-42F (French)		
5100-42G (German)		
5100-42I (Italian)		
5100-42S (Spanish)		
5100-43	Microphone Anchoring Pads	50 per Pkg
5100-44	Cuff Anchoring Pads	50 per Pkg
5100-45	Cuff Anchoring Strap	5 per Bag
5100-46	Carrying Pouch	One each
5100-47	Waist Belt	One each
5100-48	Shoulder Strap	One each
5100-49	Calibration T-Connector	One each
5100-31	Large Cuff & Pneumatic System Assembly; includes cuff, microphone, bladder, and pneumatic tubing with connector.	One each

Tycos ABPM Accessories List

Part Order #	Description	Package Quantity
5100-32	Medium Cuff & Pneumatic System Assembly; includes cuff, microphone, bladder, and pneumatic tubing with connector.	One each
5100-33	Small Cuff & Pneumatic System Assembly; includes cuff, microphone, bladder, and pneumatic tubing with connector	One each
5100-30	Microphone/Pneumatic Tubing Assembly Only; includes microphone, pneumatic tubing with connector.	One each
5100-34	Large cuff & Bladder	One each
5100-35	Medium Cuff & Bladder	One each
5100-36	Small Cuff & Bladder	One each
5100-37	Large Cuff	One each
5100-38	Medium Cuff	One each
5100-39	Small Cuff	One each
5100-51	Small Bladder	One each
5100-52	Medium Bladder	One each
5100-53	Large Bladder	One each

Tycos ABPM Accessories List

Tycos ABPM Accessories List

5100-21	EPSON LX 810/800 Dot Matrix Printer; with serial interface	One each
5100-22	Printer Cable	One each
5100-23	Kodak Dicronix 180 SI Printer	One each
5100-24	Printer Ribbon	One each
5100-26	Kodak Dicronix Ink Cartridge	One each
95P337E (English)	QuietTrak Operator's Manual	One each
95P337F (French)		
95P337G (German)		
95P337I (Italian)		
95P337S (Spanish)		
5100-61 (English)	QuietTrak PC Software	One each
5100-62 (German)		
5100-63 (Spanish)		
5100-64 (Italian)		
5100-65 (French)		

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4341 State Street Road
P.O. Box 220
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1-800-535-6663 (in U.S.A. only)
Fax.:315-685-3361

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